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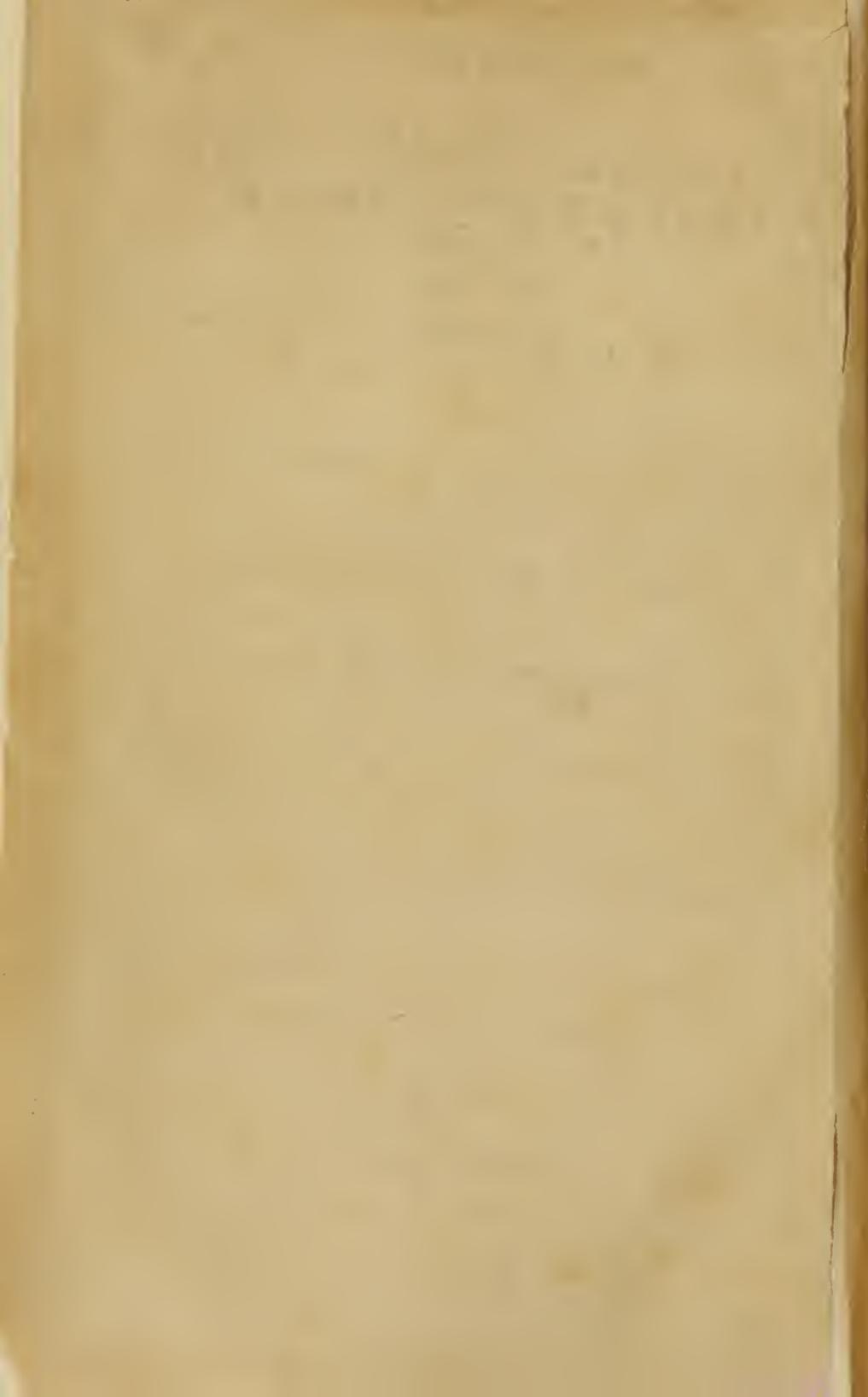
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PRINCIPLES
OF
MILITARY SURGERY;

COMPRISING,
OBSERVATIONS ON THE ARRANGEMENT, POLICE, AND
PRACTICE OF HOSPITALS,

AND ON THE
HISTORY, TREATMENT, AND ANOMALIES LIBRARY.

OF

VARIOLA AND SYPHILIS.

ILLUSTRATED WITH CASES AND DISSECTIONS.

BY JOHN HENNEN, M.D. F.R.S.E.

INSPECTOR OF MILITARY HOSPITALS.

FIRST AMERICAN, FROM THE THIRD LONDON EDITION.

WITH LIFE OF THE AUTHOR,

BY HIS SON, DR. JOHN HENNEN.

Philadelphia:
CAREY & LEA.

1830.

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1830

GRIGGS & DICKINSON, PRINTERS.

TO

SIR JAMES M[·]GRIGOR, K_NT. K. C. T. S. M. D.
F. R. S. LOND. AND EDIN.

FELLOW OF THE ROYAL COLLEGES OF PHYSICIANS OF LONDON AND
EDINBURGH, HONORARY FELLOW OF THE ROYAL COLLEGE OF SURGEONS OF
IRELAND, AND DIRECTOR-GENERAL OF THE ARMY MEDICAL DEPARTMENT,
&c. &c. &c.

SIR,

Numerous obstacles hitherto prevented the completion of the following pages. I for some time hesitated whether I should ever obtrude them on the public; but, from the moment that I had resolved to publish them, it was no longer a matter of doubt to whom I should inscribe the work.

You, Sir, in your various Official capacities, have uniformly presented to the Medical Officers of the British Army, an invaluable example of zeal tempered by judgment, and of energy combined with prudence, while science has guided both; and to the elevated station which you now fill, you have added the still higher distinction, of being looked up to as the father and friend of your department.

To you, therefore, I offer, as a memorial of grateful estimation, for public excellence and private worth, these "Prin-

ciples of Military Surgery," which have been chiefly suggested from materials collected while employed under your orders, and supported by your encouragement.

I remain.

Sir.

with gratitude and respect,

Your faithful and devoted Servant,

JOHN HENNEN.

EDINBURGH, 1st January, 1818.

LIFE
OF
THE AUTHOR;
BY HIS SON,
DOCTOR JOHN HENNEN.

THE lamented Author of the "Principles of Military Surgery," was born on the 21st of April, 1779, at Castlebar, County Mayo, Ireland, and after a career of nearly thirty-one years, spent in active employment and entirely devoted to the public service, died at Gibraltar, of the yellow fever, on the 3rd of November, 1828, aged forty-nine years and six months.

Dr. Hennen received the first rudiments of his education in his native town, and at an early age commenced the study of medicine under his father, a medical practitioner, eminent for his general as well as professional attainments.

During his apprenticeship he regularly attended the County Infirmary, where he acted as Dresser, and saw most of the principal operations in surgery.

In 1796 he was sent to prosecute his studies at Edinburgh, under the second Monro, Dr. Black, and the other distinguished teachers of that period.

In March 1798, he received a diploma from the College of Surgeons of Edinburgh; and in June, the same year, accepted the appointment of Assistant-Surgeon to the Shropshire Militia, then quartered in Edinburgh Castle. Being desirous of obtaining more active employment, he was, in March 1800, appointed Hospital Mate by warrant, and the following month promoted to the Assistant Surgeoncy of the 40th Regiment of Foot; on the day of his appointment he embarked with his corps for the Mediterranean, and forthwith sailed with the expedition under the command of Sir Ralph Abercromby, destined to Egypt. The 40th Regiment was, however, detained at Malta, at which island and at Minorca, he continued until 1802, when he returned to England, having been appointed Assistant-Surgeon to the 3rd Dragoons; with this regiment he served in Scotland and Ireland until the end of the following year, when he was promoted to the Surgeoncy of the 3rd Battalion of the Irish Light Brigade; with this corps and the 7th Garrison Battalion he continued to do duty in Ireland for about four years, when he was removed to the 2nd Battalion of the 30th Regiment, which, in 1809, he accompanied to Cadiz and Gibraltar, and ultimately to Portugal, where a wide field presented itself to his industry; and his uncommon zeal, activity, and professional attainments soon attracted the notice of Sir James, then Dr. M'Grigor, the head of the Medical Department in the Peninsula.

On the retreat of the French from Portugal in 1811, being the Senior Surgeon of the 5th Division of the British Army, he performed the duties of Acting Staff Surgeon, and after the action of Fuentes d'Onor was publicly thanked, on the field of battle, for his exertions, by Major General Dunlop, commanding the Division. He continued to serve as Acting Principal Medical Officer with the 5th Division, in its various advances, retreats, skirmishes and actions, until October, 1811, when he was promoted to the rank of Surgeon to the Forces. From Dr. M'Grigor's intimate knowledge of

Mr. Hennen's great abilities, his dexterity as an operator, and his incessant zeal in the cause of suffering humanity, the charge of some of the most important Surgical Hospitals in the Peninsula was from this period allotted to his special care.

Upon the peace in 1814, he returned with the army to England, and was placed for a short time upon half pay, during which period he retired to Dumfries, in Scotland, and entered into private practice. During this short respite from active employment, he began to arrange the materials which he had collected whilst engaged in his arduous duties with the troops in the Peninsula, and planned his work on Military Surgery: he at this period also published, in the London Medical Repository, a practical paper on Hospital Gangrene.

On the return of Napoleon from Elba in 1815, he was again called into active service, and ordered to Belgium, being placed in charge of the Jesuits' Hospital at Brussels. After the Battle of Waterloo, he had the sole superintendance of the wounded general staff, and performed many important operations on that occasion. He continued to direct the duties of the Jesuits' Hospital until September 1815, when he was promoted, by his friend Sir James M^r Grigor, who had now become the Director General of the Department, to the rank of Deputy Inspector of Hospitals. Early in 1816, on the breaking up of the Hospital establishments in the Netherlands, Mr. Hennen was ordered to Portsmouth, and placed in charge of the South Western District. He now began seriously to prepare for publication the result of his professional experience, and during the eighteen months he was stationed at Portsmouth, studied with extraordinary diligence every point connected with his subject.

In September 1817, he was removed to Edinburgh, where he, shortly after his arrival, published the first

edition of his work on Military Surgery. During his stay there (a period of three years and a half,) he continued to prosecute his studies with no ordinary zeal: he became intimately connected with the Editors of the "Edinburgh Medical and Surgical Journal," the entire management of which, during the latter part of his stay in the "intellectual city," almost entirely devolved upon him.* After having defended a thesis entitled, "De Sanitate Militum Tuenda," Dr. Hennen received, in August 1819, a degree in medicine from the University of Edinburgh. In the winter of 1820 he delivered a course of lectures on Military Surgery, and, in conjunction with Professor Thomson, gave weekly clinical reports on the cases in the Military Hospitals. In Edinburgh he became acquainted with the first literary and professional characters of that celebrated school, and we learn from the preface to the second edition of his "Principles," (which was published in 1820,) what material assistance and support he received from them.

This work acquired for its author a high reputation as an army surgeon, and in addition to the many literary distinctions conferred upon him, he latterly received from the Emperor of Russia, a magnificent diamond ring, "as a mark of his high approbation of Dr. Hennen's work on Military Surgery."†

In August 1821, Dr. Hennen embarked with part of his family for Malta, and upon his arrival there took charge of the medical department of the Mediterranean army. He resided at Malta three years and a half, and at Corfu nine months, paying during that period frequent visits to all the islands within the command.

* The original papers to which Dr. Hennen affixed his name, and published in the Edinburgh Medical and Surgical Journal were, two on the Non-Mercurial Treatment of Syphilis; an Historical and Experimental Inquiry into the nature of Small Pox; and an Essay, entitled Sketch of a Plan for Memoirs on Medical Topography. The greater part of his labours, however, while connected with this journal, were anonymous.

† Prince Leiven, the Russian Ambassador's letter to Dr. Hennen.

Immediately upon his arrival at Malta he circulated amongst the medical officers in the Mediterranean, a paper which he had published in the sixty-seventh number of the Edinburgh Medical and Surgical Journal, on "Medical Topography," and requested answers to a series of queries connected with the topography of the Mediterranean; and from the information thus furnished, in addition to the results of his own laborious investigations, he soon collected a vast body of interesting and useful matter, subsequently arranged by him, and prepared for publication, under the title of "Sketches of the Medical Topography of the Mediterranean Islands occupied by the British Forces."**

The Director General, in 1823, as an additional proof of his estimation of the Author's services, recommended him for promotion to the rank of Brevet Inspector of Hospitals. In the beginning of 1826 he was removed from the command in the Mediterranean, and placed in charge of the Medical Department at Gibraltar, where he had no sooner arrived than he commenced his topographical researches, and before the close of the year, transmitted to the Director General the most complete body of information connected with the medical history of that celebrated fortress that was, perhaps, ever collected by one individual.

From Dr. Hennen's long previous study of the subject, and the peculiarly ardent, yet candid, manner in which he pursued every professional object, no one was, perhaps, ever better qualified to investigate the nature of the late fatal epidemic of Gibraltar; and, as an instance of that cool and unbiased search after truth which characterized all his inquiries, I shall here quote a passage from the report alluded to, where treating on the subject of the endemic and epidemic diseases of Gibraltar, he thus concludes: "It cannot be

* This work, together with the Medical Topography of Gibraltar, the author of this sketch is now preparing for the press.

supposed that, in making a report upon the diseases of Gibraltar, I am called upon to identify myself with either party, or to descend into the arena of disputation in defence of one or other of their opinions; I have, therefore, determined to become the partisan of neither class of those controversialists, whose reports have agitated the medical world, on the endemic or imported nature, the contagious or non-contagious properties of the fevers which prevailed in the unfortunate eras of 1804, 1810, 1813, and 1814. The professional characters of the supporters of the opposite theories stand high, and I neither question the fidelity of their reports, (to the best of their knowledge,) nor the uprightness of their intentions; but it has long been allowed by the more dispassionate part of the profession, that much is assumed on defective evidence, that much special pleading has been entered into, and that there is often room to suppose that the opposite parties have contended more for victory than truth."

Nearly two years after the above was written, in August 1828, a fever of a suspicious nature made its appearance in Gibraltar, which soon assumed the character of former epidemics. Dr. Hennen immediately put in force every means which human foresight could devise to stay its course, and enjoying the unbounded confidence of the Lieutenant Governor, Sir George Don, all his suggestions were, in the promptest manner, carried into execution. "Our present situation," (says he, in a letter, dated the 25th October, 1828, to his Excellency the Lieutenant Governor,) "will be a matter of history, and every measure which may have spread or checked contagion will be rigidly inquired into by the public."

His exertions were prodigious,—night and day he laboured, and still seemed, except at times, equal to the task; but on the 28th of October he was seized with symptoms of the prevailing fever. He could not be prevailed upon to give up his public duties, and until

within a few hours of his death he continued to dictate letters and to sign the usual official papers. "Public men cannot always transfer their cares to satisfactory hands; and if they could, the strong interest with which they are gradually blended in the mind, and the continual hopes that to-morrow will be better with them than to-day, irresistibly persuade them, that to quit their post is as unnecessary as it would be dishonourable."*—So it was with my honoured father: on himself he could hardly be persuaded to bestow a thought; he clung to nothing but his duty, and to that he held fast until he could hold no longer.

The attack commenced with sickness and vomiting, the skin soon became yellow, and on the third day an almost fatal symptom supervened, viz. suppression of urine; this, however, was removed on the following day, and strong hopes were entertained of his recovery;—these were illusory, for at six in the morning of the 3rd November he expired.

The announcement of his death excited universal regret, but at Gibraltar his loss was looked upon as an additional public calamity; for after the necessity of his first measures became obvious, he endeared himself to all classes by his indefatigable exertions and attention to the wants of the meanest in the garrison; and it has been acknowledged by every one capable of judging, that, fatal as the disease was, but for his exertions it would have been incalculably more so.

A subscription was immediately entered into by all classes at Gibraltar, at the head of which was his Excellency the Lieutenant Governor, Sir George Don; and also in London, Edinburgh and Dublin, for the purpose of erecting a monument to his memory; and this brief sketch cannot, I think, be better concluded than by transcribing the public testimonial which has been engraved thereon:

* *Life of Dr. Bateman (anonymous.)* p. 118.

TO
THE MEMORY OF
JOHN HENNEN, M. D. F. R. S. E.
INSPECTOR OF MILITARY HOSPITALS,
AND
AUTHOR OF THE PRINCIPLES OF MILITARY SURGERY, AND
VARIOUS OTHER WORKS.

HE FELL A VICTIM TO THE EPIDEMIC FEVER, ON THE THIRD
OF NOVEMBER, 1828, AGED FORTY-NINE YEARS; AND WHILE
ARDOUOUSLY ENGAGED, EVEN TO THE DAY PRECEDING HIS
DEATH, IN THE ABLE DISCHARGE OF THE THEN URGENT DU-
TIES OF
PRINCIPAL MEDICAL OFFICER
OF THIS GARRISON.

THIS TABLET
IS ERECTED BY HIS PERSONAL FRIENDS,—NOT WITH A VIEW
OF PERPETUATING HIS NAME, FOR THAT LIVES IN THE MORE
IMPERISHABLE MEMORIALS OF HIS OWN GENIUS, BUT—AS A
TESTIMONY OF REGARD FOR A MAN WHOSE ZEAL WAS INDE-
FATIGABLE, AND WHO, IN THE DAY OF GENERAL CALAMITY,
SACRIFICED ALL CONSIDERATIONS OF HIS OWN SAFETY FOR
THE
PUBLIC WEAL.

ADVERTISEMENT

TO

THE THIRD EDITION.

A SHORT time before my father was attacked with that fatal malady which deprived his country of his valuable services, he had prepared for publication this third edition of the "Principles of Military Surgery." The work has undergone a few, but not any material alterations; the plates, which added to the expense of the second edition, without conferring any practical benefit, have in this been cancelled, and in lieu of them a short Biographical Sketch of the Author has been prefixed, which, I think, may prove generally interesting.

Some additional observations, and many references, to works published both before and since the publication of the last edition, appear throughout the work; the greater number of these were inserted by the author himself, in his interleaved copy now before me; I have added a few additional references, but I have not deemed it necessary to distinguish them from the others.

The chapter on "Miscellaneous points connected with Military Surgery" has been divided, and the sub-

ject of “Feigned Diseases” now forms a separate chapter; these are the only alterations which have been made in the work.

JOHN HENNEN, M. D.

Assistant Surgeon.

ROYAL MILITARY ASYLUM,

SOUTHAMPTON,

October, 1829.

PREFACE

TO

THE SECOND EDITION.

FROM the favourable reception which the first edition of the following work met with, both among surgeons in civil life, and those for whom it was more particularly designed, I have been induced to offer a second to their attention. My respectable publishers originally intended to print the book in two volumes; but the desire of making it more portable, and less expensive, afterwards led them to adopt a compressed and comprehensive page.

In the preface to the first edition, which was published under the title of "Observations on some Important Points in the Practice of Military Surgery," &c. I acknowledged my obligations to several friends, and I here most willingly repeat them. Mr. Vance, one of the surgeons of Haslar Royal Naval Hospital, allowed me constant access to his excellent specimens of Morbid Bones; and he rendered the permission still more valuable, by his numerous communications in illustration of every point on which I consulted him, during the period of my superintendence of the Portsmouth district; but as this experienced surgeon may on some future occasion favour the world with descriptions of his preparations, and with his professional opinions, I have expunged from this edition the very cursory allusions which I made to them in the former. To Dr. Denmark, Physician to the Fleet, I owe the use of many beautiful preparations during my residence at Portsmouth. Mr. Hammick, surgeon of the Royal Navy Hos-

pital of Plymouth, allowed me to examine the whole of his collection, and politely offered me permission to make drawings from any part of it. To these gentlemen, and to Drs. Dickson and Johnson, of the same service, my sincere thanks are offered; but much as I am indebted to the naval surgeons, I could not presume to hold out in my title page a promise of information upon a branch of service with which I was only acquainted through the medium of others.

To some of my military friends it will be seen, that I owe considerable obligations; and I take the present opportunity to offer my acknowledgments particularly to the junior classes, who have served with me on various occasions, and whose zeal and personal exertions have amply repaid me for my endeavours to acquire their friendship and confidence. To Dr. Thomson, Surgeon to the Forces, and Regius Professor of Military Surgery in the University of Edinburgh, I am under great literary obligations, for the unreserved use of his preparations and his books, and for the numerous sources of information (not hitherto generally accessible to officers of the army) to which he has directed my inquiries. The peculiar opportunities, however, which military surgeons now enjoy, facilitated as they are by the Director-General, open a very wide field for improvement, and afford the promise of much future benefit. Under these circumstances, therefore, I have oftener referred to the works of the older surgeons, and of foreigners, than I otherwise should have done; for while I deprecate the literary dishonesty of quoting without acknowledgment, I think the fastidiousness of never availing ourselves of the labours of others, is often as injurious to science; and in many cases, while an author labours to secure for himself an acquittal from the charge of pedantry, he may entail on his readers the penalty of ignorance.

It now remains for me to mention what I have done towards rendering the present work more worthy of

notice. To the Cases, Observations, and Illustrations, I have made several important additions. If I may be considered as somewhat diffuse on many preliminary points regarding the police and establishment of hospitals, it is because I conceive these details to be of the greatest practical importance; and I have enlarged my historical notices, under the impression that much has always been learned in every department of science from a knowledge of its history, and an acquaintance with what has already been done on the subject. I have added three entirely new Chapters, comprising Remarks on the Examination of Recruits; on the Detection of Feigned Diseases; on Medical Topography; on Vaccination; and on Syphilis. This last chapter, I trust, will be found a useful, as I can conscientiously say it is a faithful, statement of facts. I could with much greater ease to myself have dilated it into a volume, than compressed it as I have done into a few pages. The materials are from sources inaccessible to the majority of practitioners, and my intention in collecting them has neither been to support, nor to controvert, the opinions of any particular set of men, but to advance the purposes of science and of humanity, and thus to lay the surest basis for promoting the real interest of the profession at large.

Upon the whole, I can assert, that I have spared neither time, labour, nor expense, to enhance the value of every part of this work, by reconsidering all the cases which have occurred in my own practice, or in the hospitals under my superintendence, and by comparing them with the communications of living practitioners, and the details of preceding writers. These improvements will, I trust, justify the change which I have been induced to make in the Title of the present volume.

In one part of my task, I have been most essentially assisted by the free access which my excellent and learned friend Dr. Duncan, junior, Professor of the In-

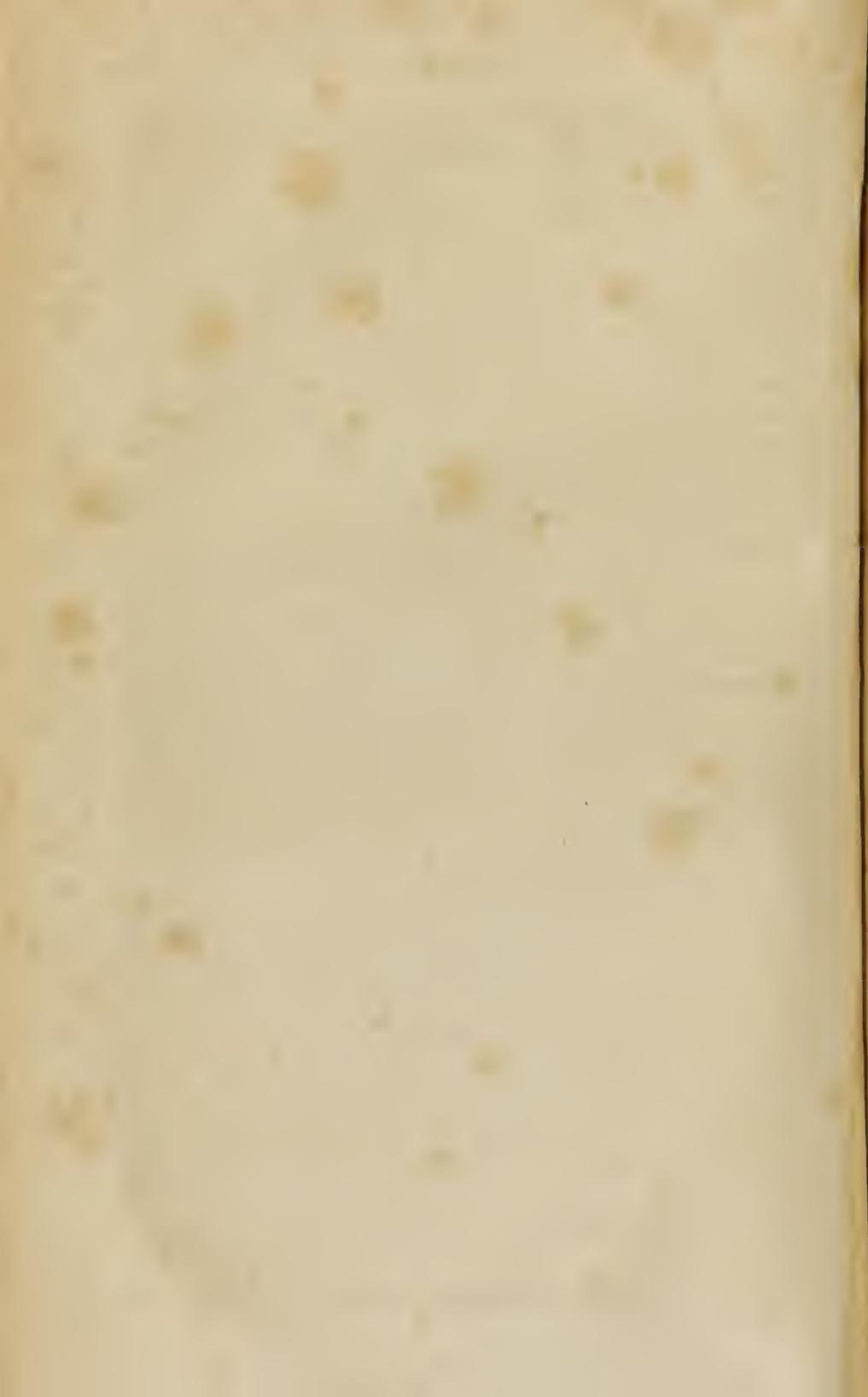
stitutes of Medicine in the University of Edinburgh, has allowed me to the Library of the College, for which my warmest gratitude is due. To other Professors in the University I am also greatly indebted. Dr. Monro opened his Museum unreservedly to me. Dr. Home communicated his numerous collections upon the history of Mercury; and Dr. Hope pointed out and explained to me those useful contrivances in the domestic arrangement of hospitals which he has introduced into the Royal Infirmary, and which have so essentially contributed to the utility of that noble charity, that nothing seems now wanting of which its original structure will admit. To these eminent individuals, and to many other medical and surgical friends in the “intellectual city,” I owe much for their uniform kindness, and I feel more than I can here express.

I have only farther to remark, that, whatever doctrinal errors or omissions may be found in the following pages, they are to be charged solely upon the author; for in neither the plan nor the execution has he received any assistance (beyond the mechanical helps afforded by some of his literary friends) which he has not acknowledged, either in these prefatory lines or in the body of the work.

EDINBURGH, 1st June, 1820.

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PRINCIPLES
OF
MILITARY SURGERY,

&c. &c.

INTRODUCTORY REMARKS.

A VERY few years have elapsed, since Military Surgery was at so low an ebb in England, that one of the most able and enthusiastic medical philosophers which the country ever produced, made the following observations on the subject:—"Practice, not precept, seemed to be the guide of all who studied in this branch; and, if we observe the practice hitherto pursued, we shall find it very confined, being hardly reduced to the common rules of surgery, and therefore it was hardly necessary for a man to be a surgeon to practise in the army." This opinion of Mr. Hunter, who was himself an army surgeon, little as it flatters his predecessors, was, to a great extent, founded on truth; but if we come to investigate the cause of this deficiency in practice, and this scantiness of precept, we shall be able easily to trace it to one of the most powerful springs of action implanted in the human mind. He must have been indeed possessed of a most glowing enthusiasm, and an utter contempt for self-interest, who would have buried his talents and his industry in a situation, where obscurity, poverty, and neglect spread all their miseries before him. These were, for years, the portion of the army-surgeons; their situation was looked upon as the lowest step of professional drudgery and degradation; and if a man of superior merit by chance sprang up in the service, or entered it for temporary purposes, he soon abandoned the employment for the more lucrative, the more respectable, and the less servile walk of private practice.—

The school was good; but the best and most natural feelings of the human heart were too deeply lacerated to permit any independent man long to continue a pupil.

A brighter day has, however, dawned on Military Surgery; encouragement has been held out to the active, the respectable, and the well educated; and the country has been repaid for its judicious liberality (tardy as it has been) by the acceptance of its offers. It is to be hoped, that no petty jealousies, nor ill-judged economy, may sap this fair foundation, and that a recollection of what has happened at the commencement of former wars may influence our future statesmen.

Ingenious and speculative men of almost every profession have affected to find traces of their favourite art in the oldest and most venerable of books; and where written records have failed, they have plunged into the unrecorded depths of antiquity, and supplied, by bold and plausible conjecture, the deficiencies of fact. In imitation of this example, I might show that man, in his earliest state, was subjected to disease;—whether proceeding from internal causes or from mechanical inflictions, it is not necessary to investigate, since it is certain that mankind early congregated together for the purposes of mutual aggression and mutual defence; and although we cannot trace the actual existence of surgeons among the armies of those barbarous hordes, we may be assured that experience would teach many of them the more simple and obvious means of relieving themselves from the injuries inflicted by the teeth or the clubs of their enemies. Some traces of humanity would probably induce these individuals to offer assistance to others, while self-interest and nascent ambition would soon contribute to spread their fame. The fortunate tribe who possessed our aboriginal surgeons would be distinguished among its fellow savages, while these gifted men became the object of love, terror, and, by a very natural transition, of adoration also. Upon the whole, without wandering farther into the regions of conjecture, we may conclude, that military surgery, rude and imperfect though it was, if not the very first, was at least among the earliest of the arts which the follies and the infirmities of mankind forced them to cultivate.

From the writings of the first of the Greek poets, we find that the army-surgeons of antiquity united in their own persons the soldier, the physician, and not unfrequently the prince, and that honours almost divine were paid them. From historical testimony we are informed, that Cyrus provided the most able physicians and surgeons to attend his army both in the field and at sieges, and that, after he got possession of Babylon, he formed in that city a dépôt of medicines and surgical instruments for their use. We also know that Alexander the

Great was equally attentive to the health of his troops; but whether these commanders had any regular hospital establishments for the cure of their sick and wounded, we are entirely ignorant. From the Commentaries of Cæsar, however, we learn that the Romans were in the habit of sending off their sick and wounded to the nearest towns whenever their armies moved:—while stationary, a separate part of the camp, or “*Valetudinarium*,” was appropriated for their accommodation, under the immediate eye of the *præfect* of the camp, or *quarter-master-general*; and in the event of great battles in the neighbourhood of cities, they were distributed in the houses of the nobility. Of the discipline observed among their wounded we know nothing; we find, indeed, that the invalids who were rendered incapable of farther service were provided for at the public expense; but whether hospitals were erected for them or not, is altogether a matter of conjecture.

From the best authorities it appears, that one of the first, if not the very first, hospital establishment, was erected at Rome in the sixth century, by Fabiola, a Christian lady, the friend of St. Jerome. Paula, another of his disciples, built several hospitals on the road to Bethlem, and others were soon spread over many of the wild and uncultivated districts of Europe, for the accommodation of pilgrims to the Holy Land; originally they were not intended solely for the purposes of the sick, but were rather a species of inns, built close to the churches and monasteries, and under the superintendence of the clergy. How they were furnished with medical officers is very dubious; but certain brotherhoods were busily occupied in their concerns, and appear to have given what assistance they could to the sick, as well as to each other. From this period hospitals multiplied throughout Europe; and, from being made places of mixed accommodation for the religious, the aged, the destitute orphan, and the sick, they gradually assumed their present form.

The learned Beckman, in whose work much curious matter upon the subject of hospitals is to be found, has been able to collect but little satisfactory upon the subject of those destined for military purposes, or indeed upon military surgery in general, in the early ages of the Christian era.* The term “*exercitus medicus*,” he has not been able to trace to any higher antiquity than the third century, and the institution of flying hospitals he fixes in the sixth. In that century the Emperor, Mauritius carried along with his army, *Despotati*, or *Διπότατοι*, (Drink-givers, in the barbarous Greek of the middle ages,) whose duty it was to carry off the wounded in battle; for which purpose, they were distributed among the cavalry, and were

* History of Inventions and Discoveries.

equipped with two stirrups on the left side of their saddles, to take up the wounded behind them with the greater ease, and were obliged to carry with them water for the refreshment of the sufferers. In the ninth century the Emperor Leo. VI. mentions them expressly in his Tactics, as a necessary appendage to an army, furnished with their field medicines and materials. In the fifteenth century the field surgeons came into some note; they were principally attached to the general officers; and although not obliged to act as combatants, received a certain portion of booty and prisoners. The field-surgeon of Henry V. of England (Nicholas Colnet) received a yearly sum of forty marks, in addition to his share of plunder; but Nicholas had to furnish three archers; and if his booty exceeded twenty pounds, he was to give up one third to his majesty. Colnet was engaged for one year only, and was obliged constantly to follow the king. Morstede also was employed as his chief army-surgeon, with twelve other surgeons, and three archers; his pay was twelve pounds per quarter, and twelve pennies a-day subsistence. What improvements may have been made in field surgery in the days of Henry's immediate successors, I have not been able to trace; but the following passage, in a letter written by a military officer* in the reign of Queen Elizabeth, may tend to show the estimation in which army-surgeons were held in the days of that sovereign:— “Every Captain of one hundred footmen doth receive weekly, upon every Saturday, his full entertainment of twenty-eight shillings. In like case, every lieutenant, fourteen, an ensign seven, our sergeant, *surgeon*, drum, and fife, five shillings pay, by way of imprest, and every common soldier three shillings, delivered to all by the poll weekly. *To the four last lower officers*, two shillings weekly, and for every common soldier twenty pence weekly is to be answered, to the full value thereof in good apparel of different kinds.” How long the British army surgeons may have continued to receive this “entertainment,” or how long they continued to take rank with the sergeants and drummers, I know not; the melioration was most probably progressive; but I apprehend we need search for no farther explanation of the low state of the profession, than what the above *exposé* of their comparative rank and pay so strikingly furnishes.

The institution of the more permanent establishments for invalids took place at Constantinople in the end of the eleventh century; the learned Anna Comnena has given an account of this institution of her father, the Emperor Alexius.† In those

* Sir John Harrington in *Nugæ Antiquæ*, 8vo. London, 1779, vol. i. p. 17. See Grose's *Military Antiquities*, vol. i. pp. 272, 277; for some curious details on this subject.

† Anna Comnenæ Alexaidos, Lib. xv. Ed. Venet. p. 363.

times the knights attended the sick and wounded themselves, compounding balsams and vulnerary drinks for them with great spirit and perseverance, although with no pretensions to scientific accuracy; for, according to Guy de Cauliac, they trusted to exorcisms, beverages, oil, wool, and cabbage leaves! The regular physicians and surgeons took the duties of the hospitals upon themselves in the early part of the fifteenth century, and were guided by a code of written regulations, and it is to be hoped, by more scientific principles; army surgery, however, remained in a very rude and neglected state for many years after this period.

The invention of gunpowder, while it certainly tended to the saving of many lives in battle, yet must have produced great individual misery. In the practice of the surgeons of that day, charms, prayers, and incantations, formed the chief part of the treatment in the new species of wounds presented to their view; and the poisonous nature of the ingredients which formed the powder, or of the balls projected by it, were the principal subjects of their theoretical disquisitions; hence, nothing can be imagined more unprofitable than a perusal of their works. The wounded in those early days, if rich, were attended at their own expense in the most commodious places of reception they could find: the poorer class (for whose surgical treatment an allowance was generally made to their commanders) who were often left to shift for themselves, or were dragged to the nearest hovels, or quartered on the houses of religious communities, where they were treated as the whims or the experience of their hosts, or of casual visitors, might suggest.

The illustrious "Henri Quatre" first established field hospitals in France, at the siege of Amiens in 1597,—a boon so grateful to the soldiers, that, by way of pre-eminence, they distinguished the campaign in which they were instituted by the title of "The velvet campaign." His son, Louis XIII. erected the first fixed hospital in that country, at Pignerol, but in what precise year I know not. Humanity to the wounded had, however, been a trait in the character of the French monarchs previous to these days; and St. Louis himself, the ninth king of that name, personally assisted in the cure of the soldiers, whose wounds were the consequences of the wars undertaken for the purpose of expelling the infidels from the Holy Land, or of his contests with our Henry III. To his lineal descendant, the hero of Navarre, was due a triumph of humanity greater than any achieved by his arms; he laid the first plan of a hospital for decayed and wounded soldiers, which the magnificence of Louis XIV. perfected into the present Hotel des Invalides, the same year in which the hospital for invalids at Chelsea was commenced by our James II. Louis also founded military hos-

pitals in all the fortified towns of his dominions and his conquests, and these establishments were much attended to by succeeding monarchs. In 1747 they were all new-modelled, and schools of military surgery and medicine were instituted at the hospitals of Brest, Toulon, Metz, Strasburgh, and Lille. It is singular that in England we still want establishments of the kind, nor have we any hospital for military purposes worthy of the national name.

Ambrose Paré, the surgeon and counsellor of Henry IV. was one of the earliest and best of army-surgeons. He followed the French armies, which he first joined at Turin in 1536, in all their operations, down to the Battle of Moncontour in 1569, which is the latest date I can find in his account of his campaigns. The state in which he found military surgery at his first entrance on its practice, may be guessed at by the very interesting account he gives of it in his 11th and 29th books; in what condition he left it, his invaluable works testify in every page; these were all collected and published together, by Guillemeau at Paris, in 1582. His "Maniere de traitor les Playes d'Arquebusades et Fleches" has already appeared in a separate form in 1551.*

Maggius published a work, "De Vulnerum Bombardarum et Sclopetorum Curatione," at Bologna, in 1552, and Alphonsus Ferrius followed on the same subject, the ensuing year at Lyons. Rota, a public lecturer at Bologna, published at that place a book entitled "De Tormentariorum Vulnerum Curatione et Natura," in the year 1555; and Leonardus Botallus, by far the best author of the Italian school, produced his work, "De Curandis Vulneribus Sclopetorum," at Lyons, in 1560. These authors, together with De Vigo, Hieronymus, a Brunswick, and Gersdorf, who flourished prior to Paré;—and J. Baptist. Carcanus, the director of the Military Hospital at Milan, who published his excellent, original, but little known work, "De Vulneribus Capitis," in 1583,—are among the principal early continental surgeons who have professedly written on, or incidentally treated of, military surgery; a catalogue, the farther extension of which would be of very doubtful utility, and which, indeed, embraces but a very few more names, and scarcely one of celebrity.

The earliest English military author, of whose work I have any knowledge, is Thomas Gale, who served as a surgeon in the army of Henry VIII. at Montruil in 1544, and also in that of King Philip at St. Quintin in 1557. He published the "In-

* Percy gives different dates; he says that Paré published in 1545, in which date Portal agrees with him, and that Maggius published in 1548. I have followed Haller, (Biblioth. Chirurg.) in every date where my researches after the original works have failed.

stitution of a Chirurgeon," and, together with it and other tracts, a Treatise on Gunshot Wounds, London, 1563, 8vo. He refutes the opinion entertained by Hieronymus, a Brunswick, De Vigo, Ferrius, and others, concerning the poisonous nature of gunpowder, and the actual "ustion" produced by the ball. The general state of military surgery, however, was most deplorable in his day; tinkers, cobblers, and the most humble practitioners of the Veterinary art, forming a part of the surgical attendants on the army in the field.*

William Clowes, a naval surgeon, who afterwards served in the army, published in 1591 "a Proved Practice for all Young Chirurgeons, concerning Burnings with Gunpowder, and Woundes made with Gunshot, Sword, Halberd, Pike, Launce, or such other." This work was twice reprinted, with some variation in the title-page; its principal merit consists in recommending mild dressings. Quercetan's "Sclopetarius" was translated and published about this time at London (1590) by John Hester.†

Peter Lowe may also be reckoned a military writer; he served for many years in France and Flanders in the wars of Henry IV. and published at London, in 1597, "A Discourse on the whole Art of Chirurgery," which went through several editions, in which he treats of gunshot and other wounds.

John Woodall, who accompanied the troops sent by Queen Elizabeth to France, in 1589, and who also served in the navy in the East Indies, and became Surgeon-General to the Company, published his Surgeons' Mate, or Military and Domestique Surgery," after the queen's death, but in what year I have not been able to ascertain. His "Viaticum, or Pathway to the Surgeon's Chest," an appendix to the former work, was published in 1628. Both contain many useful practical facts, and evince considerable learning, and great humanity. Paré's book on gunshot wounds appears to have been previously translated into our language by Hammond, in 1617.

Richard Wiseman published his "Eight Chirurgical Treatises," in 1676, one of which is expressly on gunshot wounds. His book abounds in valuable facts, collected from his practice both in the military and naval service of his country, as a reward for which services, he was appointed Sergeant Chirurgeon to King Charles II.

John Brown, sworn Chirurgeon in Ordinary to Charles II., published "A complete Discourse of Wounds, both in gene-

* See some curious extracts from his works in Aikin's Biographical Memoirs of Medicine in Great Britain, 8vo. London, 1780.

† Quercetan or Duchesne wrote in 1576. There is also an English translation of Brunswick's book extant, published at London in 1525, entitled "The Noble Experience of the virtuos Handworke of Surgery," folio.

ral and particular, as also a treatise of Gunshot Wounds in general," at London, in 1678, a very learned work, deduced from his practice in the navy in the Dutch war of 1665, in which he was severely wounded. I am not acquainted with any other practical work published in England during the remainder of the seventeenth century, nor for the early part of the eighteenth, until at length, in 1734, a small volume by Atkins, under the title of "The Navy Surgeon," made its appearance, in which, among other subjects, the author gives the result of his practice in gunshot wounds.

John Ranby, who filled the situation of Principal Sergeant-Surgeon to his Majesty King George II., and who attended that prince in his campaigns on the Continent, and particularly at the battle of Dettingen, published a small treatise in 1744, entitled "The Method of Treating Gunshot Wounds." His professed object in this work was, to recommend plentiful and early bleeding, together with light easy dressings; to banish from the republic of surgery the extravagant use of instruments, "and, above all, to introduce the signal use of the bark."

Dr. Francis Home, late Professor of Materia Medica in the University of Edinburgh, published, in 1759, a volume of Medical Facts and Observations, in which he has introduced a short but valuable chapter on gunshot wounds, the result of a long military experience in Germany and the Low Countries, in the war of 1742, and the following years.

Almost the whole of the systematic writers on surgery in general, have introduced into their works observations and remarks, in some degree connected with military surgery, the value of which is in a great measure proportioned to the experience they have had in that branch of practice; the majority have merely copied each other, and where they have attempted to be original, it has been more on theoretical than practical grounds; thus we find one of them seriously recommending the surgeon to be much upon his guard against *glass balls*; and the dreadful effect of the splintering of these articles is insisted on at some length.*

Foreign authors have, in general, evinced much more practical acquaintance with the subject than those of our own country; indeed, their surgical education was not considered as complete until they had served a campaign or two. My limits will only admit of my naming at present a few of those of modern date.

In the year 1718, Heister published at Nuremberg his "General System of Surgery," in German, which soon after appeared in an English translation. The first book of this work

* Latta's System of Surgery

is dedicated entirely to wounds; and his third chapter treats exclusively of those by gunshot. He had qualified himself for the task, by serving in the war of 1707, between the French and Dutch in Flanders. Theden, Mursinna, Hemman, Richter, and Schmucker, are the best practical German authors who have followed him upon the subject of military surgery, and are of high and deserved celebrity.

The French authors Le Dran, Faudacq, and Le Cat, had, early in the eighteenth century, published their works "*ex professo*" on gunshot wounds, and Poissonier, Desport, Ravaton, and Thomassin, followed them in a few years afterwards. To enumerate all the other writers that have treated on military surgery in France would be more the subject of a treatise than a sketch; but it would be unpardonable not to mention the various papers on the subject which have appeared in that splendid monument of science, the "*Memoirs of the French Academy of Surgery*," through which most valuable facts and observations are profusely scattered.

Neither should the collections formed under the auspices of the old French government be passed over in silence, affording as they do many excellent papers, and offering a plan highly worthy of imitation in our own armies. One of these was published at Paris in 1766 and 1772, in two volumes quarto, under the title of "*Recueil d'Observations de Medicine des Hopitaux Militaires*," edited by M. Richard de Hautesierck; another, and a very valuable one, the "*Journal de Medicine Militaire*," was edited by De Horne, and published in several volumes octavo, at the same place, in 1782, and following years. They contain ample notices of the medical topography of a number of the permanent garrisons in France, with an account of the hospitals, and the practice pursued in them, together with histories of their prevalent diseases, illustrated with cases and dissections. These works, and the institution of hospitals of instruction for the young army-surgeons, which I have already mentioned, tended much to improve military surgery in France.

The Revolution produced some able practitioners and excellent writers on military surgery; among them Baron Percy, who published, in 1792, his little book, which he modestly styles a "*Manuel*," but which is conspicuous for learning and solid judgment; and Baron Larrey, who published his "*Relation Chirurgicale*" in 1803, and his "*Memoires*" in 1812, works, the product of extensive military experience, and great professional enthusiasm. Assalini in Italy has also furnished us with an ingenious little volume published at Milan in 1812, his "*Manuale di Chirurgia*," for the use of army-surgeons; and M. Paroisse, surgeon to Jerome Napoleon, late king of West-

phalia, has given some interesting observations on military surgery in his "Opuscules de Chirurgie," which appeared at Paris in 1806.

The American revolutionary war gave rise to only one work, as far as I know, in which military surgery was touched on by a native writer of that country; it is the very short account of the result of observations made upon the diseases which occurred in the military hospitals of the United States during the contest with Great Britain, by the late Dr. Rush, and his account of the influence of the military events of the revolution upon the human body, to be seen in the first volume of the Philadelphia edition of his works. The only important facts which he mentions, connected with surgery, are the successful adoption of Ranby's plan of amputation in wounds of the joints, and the superior fortitude with which operations were borne immediately after a battle; but his papers contain some sagacious observations upon military hospitals, and the effects of a military life. A later American writer, Mr. Barton, has published a work on naval hospitals; and since the late war, Mr. Mann has given us some sketches of the campaign of 1812, and the following years.

In England, within the period of the French revolution, few practical surgeons have written exclusively on military surgery. One towering genius has touched upon it, as a part of that immortal monument which he has raised to his own and his country's fame, in the "Treatise on the Blood, Inflammation, and Gunshot Wounds." This great work of Mr. John Hunter was published in 1794, after his death. The materials were collected during a period of active service abroad, whither he went as senior staff-surgeon in the year 1760, a rank which he held in Belleisle and in Portugal for the remainder of the war. In the year 1790, he was appointed to the joint offices of surgeon-general to the army, and inspector of regimental infirmaries; and, in conjunction with the physician-general, Sir Clifton Wintringham, held the superintendence of the department. Staff-surgeons, as well as physicians, were, at that period, and antecedently, selected from civil life on the spur of any expedition, and very rarely from the regimental surgeons.

The names of Pringle, Brocklesby, and Monro, survive in their works; but, previous to the time of Mr. Hunter, no publication with which I am acquainted was produced by the staff or regimental surgeons; although the appointment of the latter was coeval with their corps, and many of them, consequently, had ample opportunities for observation. On the lamented death of Mr. Hunter, a board was formed, which dates from his late majesty's order, issued through the secretary at war, in October 1793. This consisted of a physician-general, a sur-

geon-general, and an inspector of regimental infirmaries, who were invested with distinct but jarring powers, and continued to act till 1808, when it was dissolved, and new-modelled, upon the basis of responsibility as a body, constituted of a director-general and two principal inspectors. On the peace establishment of 1817, one of the latter officers ceased to be borne on the returns of the staff of the army. A board appears to have been established early in 1756, by order of the Duke of Cumberland, consisting of the physicians belonging to the hospitals of his majesty's forces, the surgeon-general, and principal surgeon, and Purveyor to the hospitals, who had it given them in charge conjointly to digest certain rules for regulating all hospital matters. This board, however, seems gradually to have been dissolved, and its power merged in the appointment of the principal hospital surgeon to the new situation of inspector of regimental infirmaries.* The precise dates of the appointments of the surgeon-general, and of the physicians, &c., I have not been able to ascertain.

The circumstance of a long war gave rise to many divisions of rank among the officers of the medical staff; but several of these were abolished by the King's warrant of 1804, while the situation of those who were left was seriously improved. The Staff is now composed of a certain number of Inspectors and Deputies, Physicians, Surgeons, Apothecaries, Assistant-Surgeons, and Hospital-Assistants, with commissions, and of some Hospital Mates and Dispensers, who hold their situations by warrant.

During these numerous changes in the department, which, it must be confessed, were loudly called for by the circumstances of the times, very little indeed was done for the sciences of Army Medicine and surgery; and those who were best qualified by experience to write on these subjects, were the last to employ their talents in publishing the fruit of their observations. The natural consequence of this was, that when young men entered the service of their country, they had no practical guides to point out to them the peculiarities of the situation and the habits, constitutions and accidents, of that class of men, whose health and lives were intrusted to their care. The demand for medical officers for the armies naturally stimulated the public lecturers, and the professed writers, to turn their attention to those points which more peculiarly concerned that class of their hearers and readers; many ponderous "tomes" were therefore dragged from their dusty abodes, and, with the aid of a few cases which an

* Vide "Economical and Medical Observations tending to the Improvement of Military Hospitals," &c., by Richard Brocklesby, London, 1764, p. 30.

accident, a duel, or a volunteer field-day occasionally supplied, systems were formed. This was quite sufficient for the men of established character in settled practice, but it became necessary to do something more to satisfy the increasing demands of the war, and the practice of the great naval hospitals at home afforded the public teachers a source of secondary information on these points; while few, if any, of them, had ever been in the service, or had treated a series of military accidents from their infliction to their termination. In place of practical facts, therefore, the ingenuity of conjecture and the poignancy of wit were occasionally called into action; the army-surgeons, many of whom were able although their multifarious employments did not permit them to write, were hinted at as ignorant “routiniers;” while they were acquiring knowledge in the volume of nature, the lecture-room and the press poured forth, in many instances, the fabrications of imagination, the modesty and forbearance of those who were really qualified to instruct, were construed into inability, and some teachers and writers, without taking time to deliberate, or even without having data to deliberate on, were they so inclined, essayed to involve in promiscuous reprehension the whole body of army practitioners, and held them up to derision and contempt; imitating the example of those critics, who, to use the language of a celebrated author,* “by long digressions unsought for, and universal censures unprovoked, have forced into the light, with much pains and dexterity, their own excellencies, and other men’s faults, with great justice to themselves, and candour to those they criticise.” On this subject I shall not dwell; the “lites chirurgicæ” have been already too numerous, and it has been too long the practice of the members of the liberal professions to allow differences of this kind to degenerate into personal illiberalities, while the taste of the age seems to strengthen the tendency. How melancholy, that the professors of a science, whose legitimate objects are the happiness and comfort of mankind, should be foremost in this race of ribaldry.

The various periodical works with which the present day abounds, furnish numerous detached papers and cases connected with military surgery; but Mr. John Bell is the first, in point of time, among the living authors, who has paid particular attention to it, in his well known “Discourses upon Wounds.” (Edinburgh, 1795.) He was followed by Mr. Chevalier, who published a small volume on “Gunshot Wounds;” which, in the form of an essay, gained the prize given by the Royal College of Surgeons of London for the year 1803.

In 1804 a work appeared under the title of "Chirurgical Institutes on Gunshot Wounds," by St. John Neale, the author of which refers to his experience as an army-surgeon in the American war, although his book seems principally to be a compilation and translation from Le Dran.

Mr. Charles Bell, in his "System of Operative Surgery," has enlarged upon many points of military surgery; and, in his second edition, (London, 1814,) has incorporated a Treatise on Gunshot Wounds, which is also published in a separate form. In his "Quarterly Reports" also, which have appeared occasionally since that period, he has continued his remarks upon the subject.

Mr. Guthrie, deputy-inspector of hospitals, from his extensive practice in the Peninsular war, has added a valuable work to military surgery, in his book "On Gunshot Wounds of the Extremities requiring Amputation, &c." (London, 1815;) and Dr. Thomson, surgeon to the forces, and regius professor of military surgery in the university of Edinburgh, has furnished us with a faithful "Report of the State of the Wounded in Belgium after the Battle of Waterloo;" (Edinburgh, 1816.)*

Mr. Hutchison, in his "Practical Observations in Surgery," (London, 1816,) and in his "Farther Observations on the Subject of the proper Period for Amputating in Gunshot Wounds," (1817,) has given us some valuable remarks, and a series of reports on the surgical results of the great naval action at Algiers, well worthy of attention.

Mr. Allan, in his System of Surgery, (Edinburgh, 1819,) has given a very good practical chapter on Wounds, drawn from his own experience in the naval service.

In the works published by Sir Gilbert Blane and Dr. Trotter on the diseases of seamen, much important matter connected with military surgery is also to be found. Indeed, we owe much to the naval surgeons in general for many improvements in the treatment of wounds, and it is only to be lamented that they have not favoured us with more observations on a subject in which they are so well qualified to instruct.

In the last edition of his Surgical Dictionary, (1825,) and in the last edition of his First Lines, (1826,) Mr. Samuel Cooper, surgeon to the forces, has incorporated many very valuable observations and cases, derived from the best foreign and domestic sources, as well as from his own personal experience in the field, and in the military hospitals of Holland, Belgium, and France.

Dr. Millingen, surgeon to the forces, published in the year

* Second and third editions (with many valuable additions) of Mr. Guthrie's work was published in 1820 and 1827. Mr. Hutchison also has published a second edition of his Observations, 1826.

1819, a Manuel for the use of Army Medical Officers on Active Service, in which he has proposed some very important improvements in the arrangement of our field equipments, which, if adopted, cannot fail to add to the comforts of our wounded soldiers, and to the ease and convenience of their medical attendants.

The following observations, which insensibly grew upon me to their present bulk, are the results of an active military life during the eventful period of the last twenty years, a very small portion only of which, has been unoccupied by the study and the actual practice of military surgery,—in the Mediterranean; throughout the whole of the Peninsular campaigns; in the hospitals of France; and, lastly, from the very commencement to the termination of that short but bloody campaign, (1815,) which has for a time settled the fate of Europe, during which the charge of a very large hospital establishment, and the general superintendence of the wounded staff and regimental officers, were specially intrusted to me.

To collect, or even to enumerate, all the different injuries inflicted in war, would occupy a lifetime; their direction and their importance vary from a number of causes dependent on the circumstances or the situation of the contending parties; and it is much to be questioned, whether the most elaborate description of individual cases, where they are not distinguished by some illustrative peculiarities, do not tend rather to confound than instruct the reader. To these, therefore, I have confined myself; and it is but reasonable to suppose, that, with a knowledge of the more important species of injuries, little difficulty will be experienced in treating any of the lesser that may occur. A system, it is true, would not have been complete without a special enumeration; but, in what is here offered to the profession, I state principally what I have seen, without pretending to embrace all that has been seen by others; although I trust little of importance will be found to have escaped me.

At the termination of a series of wars, which, for a large portion of a century, have desolated the fairest regions of the European world, and drenched their fields in blood, the medical philanthropist will naturally ask, what results have accrued from such ample sources of experience? What progress has been made in softening the miseries of pain and disease, and in extracting from such multitudes of victims, antidotes to the waste of human life? The younger practitioner also, who may enter the service of his country, will inquire, where am I to collect the fruit of that experience, with which so many campaigns have enriched my predecessors? and how, if the opportunities come within my reach, am I best to avail myself of

them? It is in some degree to answer these interrogatories, that I have ventured to make the following observations. In arranging them, I have carefully availed myself of the written and oral remarks of the best army surgeons, both domestic and foreign, to whose works or conversation I have had access, or who have had more experience than myself. I have studiously avoided controversial discussions, where they could lead to no practical results; and theory, unsupported by experience, I have altogether rejected; well knowing how much the young practitioner has to learn at the patient's bed-side when he comes there fraught with opinions acquired from books or lectures only. With this in view, I have given the accompanying cases, nearly as they were taken down in large hospitals, or private practice, without, however, embarrassing them with trivial diurnal occurrences, which would only have enlarged the narrative, without adding to its value.

The system of subordination and progressive responsibility, which is of such vital consequence in all military establishments, is in none of greater importance than in military hospitals. While it throws up the most secure barrier against disease, by the enforcement of well-digested regulations, it ensures the prompt and vigorous treatment of the sick soldier, and affords facilities to his professional attendant, which no other situation possibly can, of adding to the general stock of knowledge. The surgeon is indeed, from the very nature of his profession, less fettered by the letter of military law, but by no means less amenable to its spirit, than other classes of officers; and while the desire of investigation is kept alive, by the frequent opportunities of indulging it, the rashness of inexperience and the crudeness of theory are restrained, by the gradations of rank and seniority.

It is not, however, by a cold and servile performance of his duties, that the military surgeon will acquit himself with individual credit or public benefit; he must, to the habits of subordination, add professional enthusiasm:—not that ungoverned impulse which catches at the ephemeral proposals of empty theorists, or self-dubbed reformers, but that regulated and chastened zeal which has real and useful acquirement for its object, and which, while it strengthens and increases his own powers and resources, gives him confidence in his principles, and an honest independence in their application. Thus constituted, the mind will soon adapt itself to the peculiarities of any situation, however difficult or novel, in which its possessor may be placed: and if his professional duties are less splendid, and the termination of his labours more distant, than those of his purely military associates, in the scale of general good, he will stand on grounds fully as high and honourable.

As the entrance of a young man into the service presupposes, and indeed ensures, an acquaintance with the theoretical part of medicine and surgery, as taught in the schools, I have, in the following sketches, introduced him at once to the field of battle, and thence to the patient's bed-side, in the fixed hospital; but I must previously remind him, that many operations become indispensable in these situations, which may well be deferred, if not altogether avoided, in private life, or in military patients placed under different circumstances. This will sufficiently account for many discordant opinions, particularly upon the subject of amputation.

CHAPTER I.

PREPARATORY STEPS ON TAKING THE FIELD.

To enable the young army surgeon the more effectually to apply his professional talents to the relief of the suffering soldier, it will be necessary to direct his attention to some preliminary points, a knowledge of which can be derived from field practice alone; without a due observation of these, his best regulated plans, and most zealous endeavours to do good, will often end in severe, and sometimes fatal disappointment. Were he always under the eye of his more experienced seniors, it would be superfluous to dwell on these points; but the exigencies or the casualties of actual service will often throw him at a distance from all professional aid, and leave him totally dependent on the resources of his own mind, and on the scanty supplies to which original deficiency or subsequent expenditure may frequently reduce him. In this point the military surgeon is far less favourably circumstanced than his naval brethren. Their hospitals, their medical stores, their provisions, and all their little comforts, are as perfectly within their reach, after the most protracted engagement, as if no such event had taken place; their patients suffer none of the heart-rending privations of a soldier, lying wounded on the field of battle, without bedding, food, or shelter; and, when he is removed, torn from his comrades, and sent to distant hospitals by a precarious and uncomfortable conveyance over broken-up roads, or intricate

mountain passes. In short, the sailor fights at home. Could a general fix upon his own ground, the medical officer, at the head of his staff, he could easily determine on the necessary buildings for the sick and the wounded: but their shelter and their convenience are inseparably connected with the movements of their commanders, and with the facilities of transport which the seat of war may afford, and the commissariat can procure, in addition to the unemployed cavalry and wagons of the army.

The supply of hospital stores, which should accompany an expedition, rests in the hands of those who immediately communicate with the government; and has seldom heretofore been, and it is to be hoped and believed never will hereafter be, deficient either in its quantity or its selection. In apportioning it off, however, to the various divisions or corps of an army, or to the different stationary hospitals, great attention and discrimination are necessary; and the skill and experience of a medical officer are in few particulars more strongly evinced than in making his requisitions on the great dépôts, for his field and hospital supplies, with judgment and selection. With this in his view, the first and peculiar care of the medical officer, on commencing a campaign, should be carefully and minutely to examine his medical and purveyor's stores, with a view to their completion in every respect. Whether in charge of a corps of the army, of a regiment, or of a detachment, so much of the success of the surgical campaign depends upon this, that too great pains cannot be bestowed upon it. He should therefore, however circumstanced, calculate his mode and quantity of transport, as well as the comparative necessity or utility of different articles of medicines, instruments, surgical materials, bedding, utensils, and medical comforts, necessary for his situation. If the articles are to be supplied on a large scale, the estimate will be best made by a board of intelligent and experienced medical officers; and by no means should it be left at the discretion of an apothecary or purveyor, who cannot be supposed to be adequate judges of what are necessary on such occasions. For want of this precaution, I have more than once seen whole cart-loads of useless rubbish put in requisition to be forwarded to the army, while the most necessary articles for the field abounded at the stores of the dépôts.

Indisputably, the best mode of packing stores for the field will be, either in wicker baskets covered with skins or leather, fitted for carriage on horses or mules' backs, and commonly called *field panniers*; or in wooden boxes, of such a size as may easily be adapted to a similar mode of conveyance; and instead of filling several of these with duplicates of the same

articles, a small proportion of each of the most indispensable medicines and materials ought to be placed in each pair of panniers, or boxes, and an invoice of the contents of each should be pasted within the lids. Inconsiderable as this precaution may appear, the additional trouble it gives to the packer is amply compensated by the convenience and utility to the medical officers in the field.

Each regimental or staff-surgeon is allowed by the government a horse or mule, or its full price, with a pair of field-panniers and a pack-saddle, for the carriage of his field stores. The articles of the latter description generally served to the army, from their weight, clumsiness, and bad finish, completely defeat the purpose for which they are designed; and no animal can carry the necessary load for the shortest march without injury to his back, sometimes so irretrievable as to render him utterly useless for the remainder of a campaign. No pains should therefore be spared to render the pack-saddle as light, pliable, and easy to the animal as possible; and, when in movement, every precaution should be taken accurately to balance the panniers, and reduce the load within a moderate bulk. To these ordinary articles of equipment, a few bearers, a camp kettle, a camp stool, and a water bucket, will be found most useful additions.

Foreign armies often allow carts and wagons for the carriage of what they denominate their field hospital: but the improved plan of British equipment does not recognise them on the line of march, and only a proportion of spring wagons, for the use of each division, is allowed to accompany the army; and that solely for carrying the sick and wounded. It does not enter into my plan, at present, to enlarge upon the *ambulance volante* of the French armies, described at such length by M. Larrey, and found so useful; although an establishment of that kind, duly modelled, would no doubt be of important service in our field arrangement. I shall therefore confine myself to some hints on the purpose of the transports, and the selection of the stores usually allowed by the British regulations.*

Lint, surgeon's tow, sponges, linen, both loose and in rollers, silk and wax for ligatures, pins, tape, thread, needles, adhesive plaster ready spread, and also in rolls, opium, both solid and in tincture, submuriate of mercury, antimonials, sulphate of magnesia, volatile alkali, oil of turpentine, &c. &c., are among the

* See Larrey's *Mémoires de Chirurgie Militaire*, *passim*. Beckman's *History of Inventions*, by Johnson, vol. iv. 2d edit. London, 1814. Article, *Infirmaries*, &c. p. 467. The article "Despotat," in the "Dictionnaire de Sciences Médicales," and "Millingen's Army Medical Officer's Manual," for full information on the history and practical details of this subject.

articles of indispensable necessity in the panniers; and, perhaps, as useful an article of convenience as the surgeon can possess, is a supply of wax candles, with phosphoric matches, or some other contrivance for procuring instant light; for want of which I have known some very distressing accidents occur; in one case in particular, several months of the patient's life were rendered uncomfortable in consequence of a large plexus of nerves having been included in the ligature. Every surgeon will naturally have the best instruments he can procure; but it may not be amiss to remind him that his knives will often loosen, and his scalpels, more particularly, break from their handles, if not firmly riveted through at least the half of their length; an indispensable addition to his case will be a good strop to touch them on when blunted. The hone sometimes put into surgical instrument cases is of but little use, as it requires an acquaintance with the peculiar mode of using it, without which the instruments are often totally spoiled: he should have one or two spare blades to his saws, and a set of Hey's saws, which are now usually put in by the instrument-makers; and if the chain-saw, invented by professor Jeffray, of Glasgow, were substituted for, or added to, the metacarpal saw, I conceive it would be an addition of serious importance.* The straps of the screw tourniquet, usually put in instrument cases, are often defective, and their buckles unsafe; they should be carefully proved before using, lest they should give way at a critical period of an operation. The clumsy pieces of leather added to some are entirely useless; but a neat small pad, secured with a bit of tape, may be retained; and if the handles are rounded, and properly padded, as recommended by one of the most experienced field surgeons of our day, Mr. Guthrie, nothing else will be wanting to command the arteries in the shoulder-joint operations, for the very few seconds that they require pressure. The tenaculum of Assalini, and the artery-forceps with a slide, will be found very useful. The bullet-forceps in general use might be much improved, by being rendered less bulky, and its blades made to separate occasionally, or join, as in the midwifery forceps; or the very useful forceps of M. Percy substituted in its stead.† Some flexible catheters, and some flexible tubes for conveying food or medicine into the stomach, in case of injuries of the bladder and of the œsophagus, may be advantageously added to the field equipment, as they are light and portable, and the distance from the field to the fixed hospitals, where they are usually kept in abundance,

* See *Cases of the Excision of Carious Joints*, by H. Park and P. F. Moreau; with Observations by James Jeffray, M. D., Glasgow, 1806.

† *Manuel du Chirurgien d'Armée*, par M. Percy, Paris, 1792.

is in some cases considerable: they are not, however, articles of immediate or urgent necessity.*

To keep his instruments in perfect and serviceable order, must be the wish of every surgeon. Some wrap them in lint, or bibulous paper; some dust them with absorbent powders, as starch or magnesia; others smear them with mercurial ointment; and some with simple oil, as fresh as they can procure it. The latter carefully applied, and afterwards gently rubbed off, I prefer to all other modes; but whatever precaution is adopted, the instruments should be frequently examined, and the case covered with patent leather, or some other water-proof substance, and the whole loading of the baggage animal carefully secured with painted canvass.

About his own person each medical man, of course, carries a pocket case of instruments; and I would strenuously recommend that he never omits a canteen of good wine, or spirits diluted. Many men sink beyond recovery for want of a timely cordial before, during, and after operations; and many of the primary operations would be rendered much more favourable in their results, by the administration of a single glass of wine.

It is usual also to issue a certain number of what are called field tourniquets to the officers, and to some of the non-commissioned officers, drummers, and other non-combatants. In many instances life has been preserved by these instruments; but too great caution cannot be employed in guarding against superfluous and long-continued pressure; and the attendants, as well as the wounded individuals, should be warned to apply as soon as possible to the medical assistants, in order that they may examine the state of the parts in which the circulation is confined.

As the staff and regimental pannier mules or horses should never be overloaded, and as there is often a necessity for taking on forage for the use of the animals, the supply of materials must be limited to a certain weight: two hundred pounds, including instruments, panniers, and barley, &c. &c. should be, in general, the maximum. The duty of having in readiness a reserve supply is one of the most serious importance; this, however, as always devolving on the head of the medical staff, who must be supposed perfectly prepared for all contingencies, it is unnecessary to enlarge upon here. The most portable articles of medicines, and materials; of medical comforts, as tea, sugar, wine, chocolate, portable soup, lemon juice, &c.; the least cumbersome cooking apparatus, and some necessary arti-

* An instrument of late invention, and of pre-eminent utility, the patent syringe of Mr. Read, will be an addition of the most serious importance, and will not occupy more room than the clumsy pewter syringe, usually put in the field panniers.

cles of bedding, must, of course, constitute the store. The distribution also of the various ranks of medical officers to the different corps, divisions, and brigades of the army, rests with the same authority; and however superfluous the number of professional men may appear *before a battle* or a series of movements, it will very seldom be a source of complaint after these operations. In the selection of field necessities, and of staff-officers, circumstances of course must very materially influence every arrangement.

We shall suppose, however, that the army has taken the field, or opened the trenches; each of its divisions furnished with a due proportion of the general hospital staff with their stores; the field-panniers of the regiments and of the staff-surgeons complete; their surgeons and assistants present; and an arrangement made with the commissariat for the transport of the wounded to the fixed hospitals in the rear. The usual and most rational plan for providing against the casualties that will naturally succeed to the opening of the fire in the field, is that laid down by Ranby,* viz. to form in small parties, at a convenient distance in the rear, out of the immediate reach of shot and shells, where the field-panniers are fixed as a sort of table, and where some of the regimental non-combatants, the drummers, band, &c. are prepared to act as orderlies. Where, however, it can be conveniently done, especially at a siege two, three, or more points of rendezvous, at a house, farm, church, or marquee, ought to be appointed to carry the wounded to in the first instance. In either of these situations the first dressings ought to be applied, and the primary operations performed; here, also, the wounded should be selected for conveyance to the receiving hospitals in the rear; those who can walk selected from those who require mules, horses, or wagons, and the whole sent off under a proper escort, with a careful assistant, and with a due supply of rations, in such proportions as the nature of circumstances may point out. Every article, however, of this kind, particularly spirits or wine, is to be kept on a separate wagon or mule, and never intrusted to the soldiers. The most clamorous and troublesome among the wounded in the field, or before the walls of a besieged town, are generally the worst characters of the army, and the most slightly injured. Great discrimination, therefore, should be used in placing the wounded in the carts, or on the mules, &c. destined to carry them to the nearest hospital. Several even affect being contused, or stunned by the recoil of their pieces, or by the wind of the balls or shells; their object being too frequently plunder, in pursuit of which, the rations and medical comforts of their suffering fellow-soldiers are often the first object of their rapacity.

* Method of treating Gun-shot Wounds, London, p. 1744.

CHAPTER II.

GENERAL NATURE AND FIRST TREATMENT OF WOUNDS, COURSE
OF BALLS, &c.

SINCE the invention of gunpowder, war, which was formerly decided by muscular strength, has been conducted upon more scientific principles, deduced from theory, and confirmed by actual experiments. Generals are not only aware of the strength of the army they command, but can, to a certain extent, estimate its probable reduction by the effects of the fire of the enemy; hence we find, that, prior to the French Revolution, when the adoption of an entirely new system of tactics put all calculations at defiance, there was a certain scale upon which the casualties of a campaign were usually computed; it was supposed, that, on taking the field, three men in every hundred would be upon the sick list;—that, in the middle of a campaign, this number would be doubled,—and that, towards the close of operations, it might be increased to ten or twelve per cent, exclusive of the effects which might arise from any epidemic disorder.* The wounded after a general engagement were calculated at the rate of ten per cent.; and we even find, that the proportion which the wounds of different parts of the body bore to each other were also estimated. Dr. Zetzell, in a discourse on the diseases of the Swedish army,† read before the Royal Academy at Stockholm, states, that in a battle between two armies composed of infantry, the upper part of the body is most in danger, and that, for two shot in the belly, three or four will take effect in the neck or breast, seven in the head, ten in the arms and hands, four in the hips, five in the legs, one in the knee, and two in the feet. This, however, is a division altogether arbitrary, and must necessarily vary according to the position of the contending parties.

It may not be uninteresting to detail a few circumstances which can be calculated with a considerable degree of accuracy, and which, without leading us far into the doctrine of projectiles, may throw some light upon injuries from gunshot. The Chevalier Folard, in his account of the Catapultæ, Balistæ, and other engines of the ancients, states, that their powers were lit-

* Ravaton, p. 635.

† Tal om Sjukligheten e facit, 4to. Stockholm, 1779.

tle inferior to those of our modern instruments of destruction, and, indeed, in the works of Celsus, (lib. vii. chap. 5,) we find that the effects of leaden balls and stones, projected from the engines then in use, were by no means unknown; but of their precise velocities we know little or nothing. By the calculations of D'Antoni,* it appears that the initial velocity of a cannon ball is nearly two thousand feet in a second, and that of a musket about seventeen hundred; but these velocities rapidly diminish from the moment the ball quits the mouth of the gun, and are also greatly influenced by the quantity and quality of the powder, the force used in ramming the wads, the elevation of the gun, and the length of the bore; the weather also influences the velocity of a ball, for, in a very dry state of the atmosphere, it is a seventh greater than when it is loaded with vapour. In sieges, balls of very heavy metal (32lb.) are employed; in engagements in the open field, the largest shot seldom exceed 12lb., and go down to 1lb.; the other species of shot are the common musket ball, fired singly from muskets, or discharged in cases from field pieces; grape, which consists of small iron balls, disposed in linen bags fastened to a wooden bottom, in the middle of which is a spindle, round which the balls are secured by cord or wire; or case-shot, which consists of the same small iron balls put into tin cylinders, the bases of which are closed by two circular pieces of wood. The last kind of projectiles are shells, or hollow iron spheres, filled with powder, which may act either before or after their explosion. The closer the contending parties are to each other, the more deadly will be the effects of all these balls; thus, according to D'Antoni, a 32lb. shot may pierce a file of 70 men, a 16lb., a file of 48, an 8lb., a file of 40; a 13oz. shot, a file of 20; a 6oz., a file of 16; a 1oz., a file of 4, if very close to them, and propelled by a certain degree of force,—while a shell will pass through from two to five men, and will kill or wound by its splinters from six to nine; the distance and the resistance will of course produce great variation in the action of all these missiles. It must be confessed, however, that, much as the artillerist and engineer are interested in ascertaining these points with correctness, it leads to little improvement in surgery, except in as far as it shows the enormous violence with which the bones may be fractured, and their fragments dispersed either into the medullary cavities or the surrounding soft parts.

Among the ancient surgeons, who had learned and abstruse theories to support, respecting "the burnings" and "the poisonings," and "the concussions," of gun-shot wounds, every

* Treatise on Gunpowder, &c., by D'Antoni, translated by Thomson, 8vo. London, 1789.

little accidental variation in the external appearance of the shot-hole, and every shade of mental agitation in the wounded man, were fondly dwelt on as illustrative of their own particular doctrine; and even to the present hour some writers enlarge on these appearances, as if they were at all essential to the treatment, and puzzle themselves with definitions, as if every practitioner acquainted with the subject, even from books, did not know that a gun-shot injury is a violent contusion, with or without solution of continuity, suddenly and rapidly effected by a solid body projected from fire arms;—and nothing more, so far at least as definition is concerned.

The effects of a gun-shot wound differ so materially in different men, and the appearances are so various, according to the nature of the part wounded, and the greater or lesser force with which it has been struck, that no invariable train of symptoms can be laid down as its *necessary* concomitants. If a musket or pistol ball has struck a fleshy part, without injuring any material blood-vessel, we see a hole about the size of, or smaller, than the bullet itself, with a more or less discoloured lip forced inwards; and, if it has passed through the parts, we find an everted edge, and a more ragged and larger orifice at the point of its exit; the haemorrhage is in this case very slight and the pain inconsiderable, insomuch that in many instances the wounded man is not aware of his having received any injury. If, however, the ball has torn a large vessel, or nerve, the haemorrhage will generally be profuse, or the pain of the wound severe, and the power of the part lost. Some men will have a limb carried off or shattered to pieces by a cannon ball, without exhibiting the slightest symptoms of mental or corporeal agitation; nay, even without being conscious of the occurrence; and when they are, they will coolly argue on the probable result of the injury: while a deadly pallor, instant vomiting, profuse perspiration, and universal tremor, will seize another on the receipt of a slight flesh wound. This tremor, which has been so much talked of, and which, to an inexperienced eye, is really terrifying, is soon relieved by a mouthful of wine or spirits: or by an opiate; but above all, by the tenderness and sympathizing manner of the surgeon, and his assurances of his patient's safety. Where some important or vital organ is injured, considerable pain and much anxiety is a general consequence; these will be more particularly considered in treating of the wounds of particular parts.

If the ball has passed through the fleshy part of the arm, thigh, or buttock, we do no more than sponge the part clean, place a small bit of folded lint on each orifice, which we retain by two cross slips of adhesive plaster, and lay over, at most, two or three turns of a roller. The ball will frequently have

passed nearly through the limb, and be retained only by the elasticity of the common integuments; there we cut upon and extract it at once; and we should lay it down, as a rule not to be deviated from, to extract on the spot every extraneous body that we possibly can, either by the forceps alone, or with the aid of a bistoury. But those who best know the field of battle will easiest admit how often it is impossible to do all in this respect that they could wish.

A ball will often strike the thorax or abdomen, and to an inexperienced eye, will appear to have passed directly across, or to be lodged in one of the cavities. If great difficulty of breathing, or haemorrhage from the mouth, with sudden paleness and laborious pulse, in the one case; or deadly faintness, coldness of the extremities, and the discharge of stercoraceous matter from the wound, in the second—are not present, we shall find that perhaps the ball has coursed along under the integuments, and is marked in its progress either by a redness which Mr. Hunter compares to a blush, or by a wheal, or dusky line, terminated by a tumour; on opening which, it will be easily extracted.* In some of these long and circuitous routes of balls where we have not this mark, a certain emphysematous crackling often discovers their course, and leads to their detection.

The ball is, in many instances, found very close to its point of entrance, having nearly completed the circuit of the body. In a case which occurred to a friend of mine in the Mediterranean, the ball, which struck about the Pomum Adami, was found lying in the very orifice at which it had entered, having gone completely round the neck, and being prevented from passing out by the elasticity and toughness of the skin which confined it to this circular course. This circuitous route is a very frequent occurrence, particularly when balls strike the ribs, or abdominal muscles; for they are turned from the direct line by a very slight resistance indeed, although they will at times run along a continued surface, as the length of a bone, along a muscle or a fascia, to a very extraordinary distance. If there is nothing to check its course, and if its momentum is very great, it is surprising what a variety of parts may be injured by a musket ball. I have seen cases where it has traversed almost the whole extent of the body and extremities. In one instance which occurred in a soldier with his arm extended in the act of endeavouring to climb up a scaling-ladder, a ball which entered about the centre of the humerus, passed along the limb, and over the posterior part of the thorax, coursed among the

* See his Observations on Digestion, contained in "Observations on certain Parts of the Animal Economy." Lond. 1786, p. 165.

abdominal muscles, dipped deep through the glutæi, and presented on the fore-part of the opposite thigh, about midway down. In another case, a ball which struck the breast of a man standing erect in the ranks lodged in the scrotum. Sometimes two balls are fired, and inflict two distinct wounds; or one large wound may be inflicted, both balls entering together and passing through; or one ball may pass through, and the other lodge;—no deviation from the common principles of treatment is required on such occasions.

A very slight obstacle will suffice to turn balls from their course; and many “hair-breadth ‘scapes” are narrated among military men, where a button, a watch, a book, or a handkerchief, has been the means of preserving life. It was at one time rather a prevalent idea, that silk had the power of rendering its wearer, to a certain extent impenetrable to a musket ball; and, as a very natural consequence of this opinion, waistcoats of that material were recommended to be worn. I know of no instance where silk has been more useful than any other substance in turning a ball. A case has come within my knowledge where an officer was struck by a ball, which, first impinging against a silk handkerchief worn in his breast, not for safety, but convenience, was so far from being turned, that several duplicatures of the silk were actually carried into the pectoral muscle: it served, however, one useful purpose, for, on withdrawing it from the wound, the ball was extracted, bedded in its folds. Another case has still more recently been stated to me, where a musket ball struck the thorax, and carried into the cavity several plies of a silk handkerchief; others have occurred where the ball has, as it were, concealed itself in the plies of the silk, and a severe contusion has alone marked the situation of the blow.

Where a ball has entered any of the cavities, its course is often rendered very obscure. The discharge of the peculiar fluids, as air, urine, feces, &c. will very clearly detect it, if the organs containing them are wounded; but I have observed and demonstrated several cases in which the ball has fairly penetrated the parieties of the thorax, but more frequently the abdomen, and yet the organs contained under the point of its entrance, or even at that of its exit, have not been injured. I was first led to an examination of the passage of balls, not only along a convex surface, but also along a concave, from seeing the course of some musket balls which had deeply grazed along, but not penetrated the arm, when it was in a curved position, as in a soldier when firing his musket. In this posture of the soldier, I have frequently seen the mark of the ball commencing at the wrist, and, instead of going through, or perhaps flying off at a tangent, and striking the breast, go all round between the shirt

and the skin, furrowing the latter, and going out at the point of the shoulder, thus describing a portion of the circumference of a circle. In mounted officers also I have seen many instances where the ball has struck the outside of the calf, and, from the bent position of the knee, has been thrown up into, or above the popliteal space, rendering all search after it useless for a long time. Indeed, one eminent London surgeon, who was consulted in a case of a general officer whom I attended, and who had been wounded in this very way, could not believe that the ball had lodged at all; it was discovered, however, in the thigh, by a Parisian professor, where I asserted it would be found; its entrance had been clearly demonstrated by an abscess, which formed in its course, and discharged, on being opened, several pieces of stocking and pantaloons, with clots of blood; but the most accurate and patient investigation could not detect it for many months.

In six fatal cases which I very minutely examined, this occasional course on a concave surface was very visible. In two, the ball passed between the lungs and pleura costalis, entering on the right of the sternum, coursing round, and passing through the opposite side near the spine. In one, the ball entered over, and was supposed to have passed through the spleen; on dissection, it was found to have passed along the posterior part of the spleen, and lodged beside the spine, leaving a furrow all round from its entrance to its lodgment. In one, the ball entered exactly over the spleen, and passed round to the middle of the tenth rib of the right side, furrowing the diaphragm. In two, the balls entered close to the umbilicus, and passed out exactly opposite, beside the spine; the men were supposed to have been shot through the bowels; but it was found that the balls had passed round the abdominal parietes, running between them and the contained viscera, without opening them, and had passed out. In all these cases inflammation was present to a very high degree; and in one, gangrene was so far advanced as to render dissection extremely offensive. A further proof of the propensity of balls to take a curved direction, is often seen in cases where they strike the front of the hat, and, running round, carry off the hinder tassel.*

If the ball has passed fairly through the parietes of the thorax, or abdomen, we dress both orifices, as in the first case; and if no haemorrhage has followed, take away from sixteen to twenty-four ounces of blood from the arm. We should be equally attentive to the abstraction of blood, in cases where a

* See Le Vacher, in *Mémoires de l'Academie de Chirurgie*, tome iv., or tome xi., of the 12mo. edition, for some valuable observations on this subject.

round shot, or piece of shell, has grazed the head, neck, thorax, abdomen, or any of the joints, or where they have been contused by the splinters of a shell, flying stones, or clods of earth. In all these cases we may also derive much future benefit from unloading the bowels by a calomel pill, with some antimonial powder; a medicine which, both from its purgative power and its portability, should always be ready in the field panniers. In cases where the skin is only slightly torn or ruffled, we dust a little scraped lint or charpie on the track, and lay a pledget of emollient ointment over it. It is astonishing how differently a wounded man feels and speaks of the surgeon who performs these simple little offices for him in a neat and dexterous manner, and of him who roughly, confusedly, and without any apparent interest, hurries over his dressings with a slovenliness ill concealed by prodigality of plaster, lint, and bandages.

The remarks I have now made refer to simple wounds, where no important or vital organ is injured. I shall next advert to the field treatment of the more complicated cases arising from gunshot, and which either require amputation on the field, or shortly after removal to the fixed hospitals.

1st.—It frequently happens that an arm or leg, or perhaps both, are carried completely off by round shot, leaving an irregular surface of jagged and lacerated soft parts, and a projecting bone shivered to pieces. The obvious plan to be followed in this case, is to reduce this horrid-looking wound to the simple state of a limb which has been separated by art.

We carefully examine the extent of the injury done, particularly to the bone, and amputate on the sound part, as far beyond the injury as we conveniently can. If, however, the bone is splintered to the very joint, or so close as to excite our fears as to future consequences, we operate beyond it, on the upper part of the limb. If the head of the humerus itself is injured, or the shaft splintered, with much destruction of the soft parts; or if the head of the bone alone is left in the glenoid cavity, the rest being carried off, we forthwith take it out of the socket; an operation as simple, if properly planned, as any in surgery; and one which, on all occasions where the bone is injured high up, is infinitely preferable to amputation lower down. It not unfrequently occurs that the arm is carried completely out of the socket; and in this case very little more remains for the surgeon than to pass a ligature round the arteries, *even though they do not bleed, as often happens*, to cut short the leash of nerves, which in this case usually hangs far out of the wound, to bring the lips towards each other by adhesive straps, and to support them by proper compress and bandage.

The operation of excision of the head of the humerus, as recommended and practised by Boucher, Thomas, Moreau, and other French surgeons, and by White and Park in England, is a proposal well known to all military surgeons. It is not, however, generally adopted; I have never seen it performed on the field, and in hospital practice I have only seen one case of it. The frequency of its removal by M. Larrey and Mr. Guthrie, should encourage us to hold the plan in view;* but I have not enlarged upon it as a field operation; its seriousness, the comparative rarity of the cases requiring it, and its doubtful utility, rendering it a subject of consultation in the hospital, and one not to be lightly treated of from theory alone, or from a few successful cases. If the bone is much splintered, and particularly if its periosteum, for any extent towards the condyle, is injured, we have no means to guide us to the probable boundaries of inflammation or death of the shaft; and a perfect amputation may become necessary, from these events, after the head of the bone has been removed. If the ball has only struck, fractured, or otherwise injured the head of the bone, without extensive laceration of the capsular ligament, injury to the great vessels or nerves, &c., the surgeon would be utterly unjustifiable, either in the amputation of the limb on the field by a joint operation, or in the excision of any part of it. Upon the whole, I am inclined to think, that the excision of the head of the humerus will be found to be an operation more imposing in the closet than generally applicable in the field.

Simple and safe as the operation of amputation is, at the articulation of the upper extremities with the trunk, it becomes one of the most serious in military surgery, when the lower are engaged. There is not one patient in a thousand that would not prefer instant death to the attempt. Obliged as we are coolly to form our calculations in human blood, there is still something in the idea of removing the quarter of a man, at which the boldest mind naturally recoils; and yet there are cases in which we have it only left to balance between certain death and this tremendous alternative! The propriety, and even the necessity of this operation, has been so ably and fully treated of by Mr. Guthrie, and is so well supported by two living instances (one performed by himself at Brussels since the publication of his work, in which I had the pleasure of being one of his assistants,) that I should not do justice to the subject, did I not refer to his truly practical book on this point.†

* See Park on Carious Joints; Guthrie on Gunshot Wounds of the Extremities, p. 113, London, 1815; Larrey's Memoires.

† Farther details will be given in the chapter on amputation.

2dly.—Extensive injuries of the joints form an urgent class of cases for immediate amputation. I am well aware that some very favourable joint cases have ended successfully without removing the limb; but I will venture to assert, that the pain and inconvenience of the cure, the subsequent inability of the member, and its proneness to disease, have infinitely counterbalanced the benefit derived from saving it.

An instance has come to my knowledge, in which an eminent army surgeon recommended amputation for a case of this description. Unfortunately for the patient, he listened to the hopes held out to him by other practitioners of saving the limb. After a tedious confinement, and much misery, the limb remained *appended* to his body; but, at the end of *thirty years*, he solicited his original adviser to remove the part, which was accordingly done, to his great relief.

In civil society, where the patient has always led a temperate quiet life, and the injury has been inflicted, perhaps, by a clean cutting instrument, or a small ball has passed near or partially injured the articulation, (a case so very different from that occasioned by a large shot passing into or near it, where the patient has to be dragged over heavy roads, in bad carriages, without surgical aid or medical comforts,) I know that cures have been effected; and even in military life there are instances to be found of the same kind. I would still, however, lay it down as a law of military surgery, that no lacerated joint, particularly the knee, ankle, or elbow, should ever leave the field unamputated, where the patient is not obviously sinking, and, consequently, where certain death would follow the operation.

3dly.—Under the same law, are included, by the best and most experienced army surgeons, all compound fractures close to the joints, especially if conjoined with lacerated vessels or nerves, or much comminution of the bone, particularly if the femur is the injured bone.

4thly.—Extensive loss of substance, or disorganization of the soft parts, by round shot, leaving no hope of the circulation and other functions being carried on, in consequence of torn arteries, nerves, &c.

5thly.—Cases where the bones have been fractured or dislocated, without rupture of the skin, or great loss of parts, but with great injury or disorganization of the ligaments, &c., and injuries of the vessels, followed by extensive internal effusions of blood among the soft parts.

Life has certainly been prolonged and even preserved under all these unfavourable circumstances; but the chances are extremely precarious, and few would choose to retain existence on such terms. It is very rarely, indeed, that a patient does not conform himself implicitly to the opinion of the surgeon in

cases of this kind; and I have generally found all classes pressing for the removal of their limbs.

Before proceeding to amputation, the nature of *every* injury which the patient may have suffered should be inquired into. It has happened that amputation has been performed where there has been a mortal wound through the body.

The question of immediate amputation has of late attracted an attention which its great importance naturally calls forth; but it appears to me that an idea has been impressed upon the minds of practitioners in civil life, that doubts as to the propriety of the practice had existed among the British army surgeons. For my own part, I have never known any difference of opinion on the point; in books, it is true, it has been most amply discussed before the present generation were in existence; but in British practice, all doubts have long been at an end.*

It is but justice to British surgeons, both naval and military, to declare, that immediate amputation is neither a new doctrine, nor a recent practice among them. How long it may have been in use in the former service I cannot undertake to say; but every naval surgeon with whom I have conversed informs me, that he always employed the knife where its use was indispensable, *at once*,—which implies a much earlier opportunity than army surgeons can possibly enjoy. To advert to the experience of our service in the late wars; surgeons who served in 1794 on the continent, assure me, that the greatest benefit resulted from immediate amputation, which they had recourse to, wherever they possibly could. I have the authority of my friend, Dr. Pitcairn, deputy inspector of hospitals, who served as surgeon on the staff of the Egyptian expedition, to state, that whenever the surgeons could operate upon the field in that country they did so; and, for himself, he only lamented that he could not remove more limbs in that situation, having never had any doubt upon the point, and being still more confirmed in the justice of his opinion by the results of the deferred operations. On the first landing of our troops in Portugal, the propriety of the practice was impressed upon the surgeons,

* For a most interesting historical summary of the arguments, see Professor Thomson's Report of Observations made in Belgium, &c., p. 159. I shall add one other opinion to those collected by Dr. Thomson, viz., that of Botallus, in whose day (1560) amputation was a more serious affair than at present. That experienced surgeon says, after pointing out the inutility of general scarifications, in gunshot wounds, “*De his autum quæ partes vel particule corporis fuerunt, auferendis, si digitus vel pes, manus brachium, vel tibia, taliter sint fracta; cum carnis ac vasorum laceratione multa (quod sæpe magnæ bombardæ facere solent) sic ut de horum membrarum vita, nulla sit amplius spes, illoco illa amputanda esse censeo.*” Antwerp Edition of the works of Ferrius, Rota, and Botallus, by Coninx, 1583. Botallus, chap. ii. p. 14.

as I have been informed by Mr. Gunning, then senior surgeon upon the staff, and subsequently surgeon-in-chief of the Peninsular army; the practice was constantly followed, and the precept orally delivered from surgeon to surgeon during the whole period that I served in that country, and the able work of Mr. Guthrie forcibly elucidates its propriety; while the utility of the same practice, as adopted by the French, is fully shown by M. Larrey. Finally, the results of the field amputations, after the battle of Waterloo, confirm the published experience of both these writers, and it is to be hoped that the question is now set at rest for ever.*

Men may certainly be found at all times, who, not having their own opinions formed from experience, will communicate their doubts and hesitations to those around them; but surely their crude and vacillating speculations are not to be assumed as the measure of information that has been obtained by others. Have those who conceive that the question of early amputation is still unsettled, consulted the opinions of the better-informed army-surgeons of the present day, or the writers of the past? If they have, it must be a strange misinterpretation, or a wilful misunderstanding of both, still to persevere in supposing that it wants farther confirmation. The fact is established as firmly as any other in surgery; and perhaps, in the whole range of the science, there is not one point where opinions have so little varied, among English practitioners, from Wiseman downwards. That author (anno 1676) expressly says, that the practice was to amputate on the instant, when the patient was free from fever. From him, who was writing a treatise on the duties of the army and navy surgeons, not from guess, but from actual experience, it was to be expected that he would have touched upon the subject; he has done so,—and he has dismissed it in one line as a settled point. A later author (anno 1712,) who had also the benefit of great experience in the service, and who was writing a treatise on physic, mentions this surgical practice incidentally, and as a well-known fact, tending to illustrate the opinions contained in his book, a circumstance, by-the-by, which adds much more weight to the value of the opinion than if it had been pressed into the service, and marshalled among a line of quotations on the side of a question in literary warfare. “It was very obvious to me,” says White,†

* From the returns of the British army on the Peninsula, Mr. Guthrie found that the comparative loss was as follows: Upper extremities 12 *secondary* to 1 primary; lower extremities 3 *secondary* to 1 primary. He also found that at Toulouse 38 cases out of 47 terminated favourably when amputation was immediately performed, while 21 out of 51 died where the operation was delayed. Guthrie, pp. 42, 44.

† *De Recta Sanguinis Missione*, or new and exact Observations on Fevers, in which letting of blood is showed to be the true and solid basis of their cure, as

in his book *De Recta Sanguinis Missione*, “from Chirurgical practice, that where amputations are requisite, they succeed ten to one better if the operation is performed immediately after the misfortune, than four or five days after. *This all our surgeons in the army very well know, as well as in the navy.*” Dr. Francis Home (anno 1759) lays it down as a general rule, that “*Where an operation is necessary, it ought not to be delayed a minute.*”* Mr. Geach, a surgeon of Plymouth, who published a volume of *Observations on Inflammation of the eyes, the Venereal Disease, Ulcers, and Gunshot Wounds* (8vo. London, 1766) speaks in strong terms of the propriety of immediate amputation. In “terrible gunshot wounds,” he observes, where they are very near the joints, and the bones are much shattered, we know that fever, abscess, or mortification will quickly succeed the injury, pp. 62, 76. Mr. Hunter is the leading English writer who has thrown any doubts upon the question; but he considered it from partial experience only; and Mr. O’Halloran, who has taken the same side, had hardly any practice in those cases.† The truth is, that the point was principally agitated among the French surgeons, and not among us; it was proposed as a question by their Academy in 1756, after the battle of Fontenoy, and the answers occupy a large portion of their valuable memoirs and prize essays.

The propriety of amputation on the field being admitted, the question naturally suggests itself, what is the proper period? instantly on the receipt of the wound, or consecutively? The practical reply is, *With as little delay as possible.* While hundreds are waiting for the decision of the surgeon, he will never be at a loss to select individuals who can safely and advantageously bear to be operated on, as quickly as himself and his assistants can offer their aid; but he will betray a miserable want of science indeed, if, in this crowd of sufferers, he indiscriminately amputates the weak, the terrified, the sinking, and the determined. While he is giving his aid to a few of the latter class, encouragement and a cordial will soon make a change in the state of the weakly or the terrified; and a longer period and more active measures will render even the sinking proper objects for operation. If, however, he is disappointed in his hopes, surely the dictates of common sense will point

well as of almost all other acute diseases,” &c. By J. White, M. D. London, 1712, 8vo. p. 7. This author was a naval surgeon, and practised in 1703 and 1704, upon the coasts of Spain and Portugal. He afterwards settled at Lisbon, where he successfully applied his practice of venesection to the fevers and dysenteries of that country.

* *Medical Facts and Experiments*, by F. Home, M. D. 8vo. London, 1759, p. 113.

† *Vide a Complete Treatise on Gangrene and Spacelus*, by A. O’Halloran, London, 1765. Chap. xiii. and xiv.

out the necessity of procrastination, and will restrain the surgeon from performing what he knows must ultimately be done, at a period where it is manifestly counteracting the object he has in view, to do it *at once*. Would he in the cold stage of ague administer the same remedies as in the sweating, or in the intervals of the paroxysm?

When, therefore, an army surgeon finds a patient with a feebleness and concentration of the pulse, fainting, mortal agony, loss of reason, convulsions, hiccup, vomiting, irregular chills, stiffening of the whole body, universal feeling of cold and numbness, sense of weight, change of colour, and other symptoms of collapse, so well described by Le Conte,* he waits patiently for a return towards life; he administers wine, warmth, volatiles; he sooths and he encourages; and, when due reaction is established, he performs that humane operation, the utility and necessity of which are now confirmed beyond the possibility of doubt, or the influence of cavil.†

It is a very prevalent idea among the uninformed private soldiers, and some of the junior officers, that the surgeons "lop off," as their phrase is, limbs by cart-loads, to save trouble; and sorry am I to say, that some private practitioners, whether from ignorance or design, have assisted in propagating the scandal. I shall not descend to a formal refutation of this opinion; as well might the army surgeons be charged with the deaths that occur on the field. Where the greatest number of serious injuries occur, there will the most lives and the most limbs be lost, and one day's action may occasion a greater destruction of both, than the best employed civil practitioner could witness in a lifetime. To form comparisons, therefore, between the amputations called for in civil and in military life, is not only absurd, but places the person who makes them, however high in rank, upon a level in point of intellect with the lowest vulgar. His own conscience is but too frequently the sole reward of the military surgeon; it will solace him under such unmerited reproach; and under its influence, and with science and experience for his guides, he will sometimes see cause for hope, under circumstances of apparently desperate ill omen.

Where a compound fracture happens from a musket ball, at a distance from a joint, without great destruction of the soft parts, splintering of the bone, or separation of its periosteum to any great extent, and where we conceive it possible to effect the preservation of the limb, we must pick away all the splinters of bone or shell, bits of cloth, dirt, &c. that we conveni-

* *Mémoire par Le Conte, Prix de l'Acad. tom. viii. 12mo edition.*

† Bilguer, however, takes a very different view of this operation. "De Amputatione." Halle, 1761. The operation was at one time forbidden by authority in the Prussian service, to which he belonged.

ently can. If there are sharp pieces of bone sticking out, we saw them off, and then apply the many-headed bandage and proper splints, cushioned off by tow or rags. We bleed the patient in proportion to the violence of the injury, administer a purge, and lay him on the litter, or in the wagon that is to carry him to his ultimate destination, with the limb in the most relaxed and easy position. If the fracture is of the humerus or fore arm, we may be more particular in making our extension and coaptation, and apply our bandages and splints with the view to their remaining more permanently fixed than we can in fractures of the lower extremity; particularly the thigh; for, in the latter case, it is utterly impossible to set the limb as it ought to be upon the field; and we are yet, I fear, in want of machinery to keep it steady during the journey to the rear. We are guided by the same principles in cases where balls have passed through, or but partially injured, the hand or foot. Cases have been stated where the humerus has been dislocated at the same time that a fracture has taken place: in these cases the rule should be, to reduce the dislocation immediately, as we would in private practice and in simple fractures, for if the dislocation be not reduced before the bones are united, the time will be passed for effecting the reduction.

In open sabre cuts, thrusts from pikes, bayonets, or small swords, in muscular parts, we may commence our plan of cure upon the field. After cleaning away the blood and filth, and removing any extraneous matter, within our reach, we lay the lips of the wound neatly together with straps, or if necessary, and practicable, with ligatures, and support the part with a bandage; or, if it is a deep thrust, we lay a compress along its course, and bind it up moderately tight. If the joints or cavities are injured, we employ the lancet unreservedly, and administer a brisk purgative: if the intestines are cut, and hang from the wound, we secure them to its lips by a few close stitches: if they are sound, we replace them, and close the orifice with ligatures and straps.

The gigantic blows by which bones are divided and limbs severed are not frequent occurrences in modern days. Most serious incised wounds are, however, inflicted by the sabre; the cavities of the joints are laid open, their appendages injured, the tendons divided, and the bones so deeply wounded, that, without the greatest attention, the preservation of the power of the limb becomes very questionable. The sabre wounds of the bones, like those by gunshot, are more dangerous the nearer the joint, and they, of course, become more so if extensive fissure or fracture is combined with the injury effected by the cutting edge of the weapon. If the parts are not greatly lacerated, immediate union should be attempted, except where a

small fragment of bone is separated, or its periosteum abraded, and there it will be better to remove the part at once, than run the risk of its dying for want of circulation, and afterwards acting as an extraneous body. In wounds of the cranium, if the separated bone is large, and firmly connected to the calvarium, a considerable relaxation of this rule may be allowed, for the reunion of these bones often takes place in a very remarkable manner.

There is no bone which is more frequently the subject of sabre cuts than the scapula, and none which, if preserved from motion, appears to unite with greater readiness, and less future inconvenience. Wounds about the wrist and back of the hand require more attention than any others. I have now before me a case, where, in consequence of the surgeon having neglected to place a proper splint under the palm of the hand, when the back was injured by the oblique blow of a sabre, the bones have overlapped each other so much as to form a most unsightly pyramidal tumour.

In all contusions, sprains, lacerations, or burns, from the explosion of detached cartridges or ammunition wagons, little more can or ought to be done, than cleaning the parts and applying compresses dipped in ol. terebinth., or liniment saponis, or acetous acid and water, or the simple element itself, as may be convenient; and if there is a great loss of substance, pledgets spread with some mild ointment.

In every case where we can get at any large artery that may be injured, we should invariably tie it, although at the time it may not bleed. From a neglect of this rule, many lives have been lost; and, on the same principle, we should be liberal in our distribution of tourniquets among the wounded proceeding to the rear, although pointed in our caution as to their employment.

There still prevails among foreign surgeons, and particularly the French, a strong prejudice in favour of the immediate scarifications or dilatations of all gunshot wounds. This practice originated in the idea that the wounds were poisoned; to allow, therefore, of a free discharge of the poison, and to admit of the more ready application of antidotes, was a leading indication. To change the figure of the wound was also another object; for the older surgeons had observed, that the more malignant and obstinate ulcers were of a circular form; but the employment of scarification had its opponents, and was early reprobated by Leonardus Botallus, one of the most judicious of the older surgeons. Our own Hunter, between whose opinions and those of Botallus there is a very remarkable coincidence, has contributed very much to show the inutility of the practice, and, among English surgeons, the

knife is now rarely, if ever, employed in the first instance, except for the purpose of extracting balls or splinters of bone, and other extraneous bodies, or for facilitating the application of ligatures to bleeding blood vessels.

In giving this sketch of a few of the leading duties of a military surgeon in the field, I have gone upon the supposition that there is every convenience for conveying off our wounded, and that the field of battle has been our own. Should a reverse, however, take place, it then becomes the duty of a certain proportion of the hospital staff to devote themselves for their wounded, and become prisoners of war along with them; and it may be an encouragement to the inexperienced, while it is grateful to me to observe, that I have never witnessed, nor traced, on inquiry, an act of unnecessary severity practised either by the French or English armies on their wounded prisoners; while, on the contrary, the contending nations have, in numerous instances, vied with each other in acts of tenderness and humanity to those whom the chance of war had thrown into their hands. It is also a soothing reflection, that, where the wounded are very numerous, and particularly with compound fractures, there will be a vast saving of human life by leaving them in the power of the enemy, and not dragging them with a retreating army.

Should we retain possession of the field, but without the necessary conveyance to carry off all our wounded, parties with refreshments, bread, wine, beer, soup, &c., and, above all, canteens of water, should be sent frequently over the field; and, when possible, huts, or shelter by boughs, hides, or blankets, should be thrown up, until the wounded are removed to the first station or receiving hospital.

CHAPTER III.

PREPARATION, ARRANGEMENT, AND SELECTION OF THE FIXED AND RECEIVING HOSPITALS.

WHERE an action, skirmish, or series of movements, take place in the neighbourhood of a town which contains fixed military or civil hospitals, the accommodation for our wounded is at once ready for use, and the various conveniences of stores,

kitchens, baths, pumps, &c. are a very serious advantage. In defect of hospitals, churches, manufactories, barracks, and other public buildings, must be used; and when these are not sufficient, or that particular circumstances render it necessary, private houses must be employed. The procuring of these accommodations is always an important part of the duty of the senior medical officer, and it is unnecessary here to point out all the particulars to be attended to. It sometimes, however, may happen, that an officer of little experience may be thrown into a situation which requires him to look out for accommodation for his wounded or sick, and for his guidance I would offer a few suggestions, which may materially contribute to the ease, comfort, and safety of the wounded, and abridge the labours of all classes of their attendance.

That building makes the best hospital which is situated high, dry, and detached, in which there are sufficient doors and windows admitting of cross ventilation, with open fire-places, and secure roofs and walls, with rooms of easy access, lofty, and of moderate size. With regard to this last particular, had I my choice, I should, for the majority of purposes, prefer wards capable of accommodating from twelve to sixteen beds; they are more under the eye and control of the ward-master and servants; they are kept clean with less labour, and there is less accumulation of animal effluvia. Smaller rooms are occasionally required for special purposes, and convalescents may be accommodated in those of larger size. Long suites of small rooms, communicating one with the other by a common entrance, are very objectionable; ground floors should be avoided, and hence the galleries and other elevated parts of churches are preferable to the floors, and these last are always rendered more healthy by having the beds raised from them by boards and tressels. Hammocks or cots, I should suppose, would be useful under many circumstances, particularly for convalescents. Marquees are excellent as hospitals in good weather, and temporary wooden buildings may be made highly useful; but permanent and moveable articles of this nature are excessively expensive, unfit for transportation, cold in winter, and insufferably hot in summer.

In calculating the accommodation of a hospital, the rooms should be appropriated to the number of patients, by measurement or estimate of the number of cubic feet in each; thus a room 10 feet high, 16 long, and 10 broad, contains 1600 cubic feet. Allowing 800 cubic feet for each patient, such a ward will accommodate two extremely well. Sometimes we are forced to occupy smaller bounds, and in a room of the dimensions described, we may be obliged to place three beds, thus reducing the allowance of air very considerably. It should be a

general rule, that where there are any fractional parts above the specific allowance, such fractions should always be allowed as an equivalent to the portion of air displaced by the bedsteads, tables, forms, &c. Whatever the height or cubic contents of a room may be, each bed should have a space of at least 6 feet by 6, or 36 superficial square; in rooms with low ceilings, 8 by 8, or 64 feet, and as much more as possible. The beds should never touch each other, or be distributed in pairs, as is sometimes to be seen in civil hospitals. An invariable rule should be, *never to crowd*, and to let each bedstead be completely isolated, without communication with either walls, pillars, or the other beds in its neighbourhood; to place it out of a direct current affecting the body of the person who lies in it, but to admit as much air as possible above, below, and around it; to shift it often, so as to clean beneath it; and whenever it can be done, to remove the bedding, and let it remain in the open air, or else to fold it up in such a manner that the air may freely perflate it while it lies unoccupied on the bedstead. Tenon, from whose works a vast deal of useful information may be derived, states, as the lowest allowance proper for each convalescent patient, $6\frac{1}{2}$ cubic French toises, each toise equal to 76,734 English inches, and 7 cubic toises for each sick patient, and, in proportion as that allowance has been greater, so, he says, has been the healthfulness of the hospital.* I should recommend never to crowd patients, under any circumstances where it can be avoided, in a space of less extent than the highest recommended by Tenon, and, if possible, to give them 800 cubic feet of air, except the means of ventilation by cross windows, doors, fire-places, &c. are peculiarly good.

For hospital purposes in general, the larger public buildings of a city, or spacious and commodious private houses, should be selected. Churches, granaries, convents, barracks, have all their advantages, and are often preferable to buildings originally appropriated for the use of the sick, if they are not well ventilated. Some small detached houses should also be always kept in view for particular cases. Cutting down some of the windows to a level with the floor, and elevating others to the line of the ceiling, and judiciously chequering these alterations so as to ensure the most steady and perfect entrance of cool, fresh air, and the exit of that which is hot, foul, and stagnant, will go far to render any building fit for the reception of patients, and for forwarding their recovery; but it should be recollected, that churches in catholic countries are often used for burial-places, and as, in the well-known instance of Dijon, become

* See Tenon, *Mémoires sur les Hôpitaux de Paris*, 4to. Paris, 1788, p. 193, *et seq.* Universal experience proves the justice of Tenon's remark.

fruitful sources of disease; hence buildings of this description must be cautiously avoided.*

The leading principle upon which all our plans for ventilation should be founded, is the simple fact, that air heated by respiration naturally rises to the tops of the wards, while the cooler and heavier air occupies the lower parts; hence judicious openings at the tops and bottoms of a ward will always ensure the exit of the upper stratum of air, and, consequently, produce an influx from below to occupy its place. To prevent violent currents, the mouths of the perforations should be protected by slips of board, properly disposed, at the distance of a few inches, which not only prevent the air from rushing at once into the wards, but direct it along the walls and floors, and under the beds, or any other points where we have reason to suspect the stagnation of a tainted atmosphere. In cases where opportunity admits, these fresh sources of ventilation should be opened in all the walls of each ward, and should be furnished with sliding shutters, turncaps, or similar contrivances, so as to admit of being opened and shut at will, in order to regulate the admission and exit of the air. This should be managed in such a way that the lower, or recipient openings, should be on the windward side, and the higher, or evacuating openings, in the contrary direction; but where this arrangement cannot be made, all the ventilators should be towards the most healthy aspects, avoiding as much as possible close areas, confined courts, crowded streets, manufactories, burial grounds, hospital offices, necessities, &c., or any other permanent or occasional sources of confined or vitiated air, which cannot be obviated in temporary and fortuitous establishments.

It will be necessary to appropriate some place of accommodation for the purposes of a receiving hospital. This ought to be either a large building, near the entrance of the city or town where the fixed hospitals are situated, or, if that convenience cannot be found, a house, yard, or barn; or even a few tents near each hospital, or a temporary bivouac, may always be employed for this purpose. Here all the wounded should be brought; the purveying officers should attend to supply soup, wine, bread, and such other refreshments as the medical officers may think proper, and to register the names, regiments, and companies of the patients, receive their arms, accoutrements, and necessities; to furnish them with hospital dresses, or shirts, or if these are not to be had, at least to take from them their bloody and filthy clothing, and oversee the proper ablution of their persons. Some steady medical officers should also be placed here, to relieve each other at stated intervals, in dressing and classi-

* See Guyton Morveau, "Traite de Moyens de desinfecter l'Air," 8vo. Paris, 1801.

fying the patients according to the site and nature of their wounds, which, on their arrival at their final destination, is to form the basis of their arrangement in divisions and wards. With each convoy of wounded thus sent off, a comprehensive return should be transmitted to the resident medical officer at the fixed hospital.

When time will at all permit, fatigue parties should be incessantly employed in preparing the fixed hospitals for the reception of the wounded; or, if they cannot be procured, hired labourers, or natives pressed into the service, and paid afterwards by the commissariat at a rate fixed by the local authorities. By these people, under the superintendence of proper overseers, and under the immediate orders of the purveying officers, every species of filth and nuisance ought to be most carefully removed from the rooms, staircases, galleries, and passages of the various buildings, which should be, if possible, whitewashed; large fires or stoves should be used wherever damp or confined air may be suspected; the kitchens repaired, or new ones erected; the necessaries cleaned, and proper drains cut from them, or fresh pits sunk; the tanks, wells, pumps, or pipes, placed in proper repair, and under strict control; places of security set aside for the arms, &c. of the men, and for the stores of the purveyor and apothecary; and all that variety of preparation made which experience may suggest, and which the exigency of the moment, or the nature of the service and of the accommodation may demand.

There is, perhaps, no body of men more thoughtless, when left to themselves, than soldiers: they have been so long accustomed to have all their wants supplied or anticipated, and have, in fact, been so completely transformed into machines, actuated and directed by their superiors, that, if uncontrolled, they are either helpless or degenerate. It is then that one of their characteristics, while under the eye of their officers, is completely laid aside; in their absence, and in the indulgence which they suppose a residence in a hospital implies, they forget, or wilfully neglect, the most obvious means of cleanliness and regularity, and sink into filth, sloth, and debauchery. These men, the greater part of whose lives has been passed in the open air while with their corps, no sooner get within the precincts of a hospital, and beyond the immediate cognizance of their officers, than they shut up every aperture of their wards, whether accidental or constructed for the purpose of ventilation; and so long as the means of closing a window, door, fire-place, or ventilator, is left them, more especially German and other foreign soldiers, so assuredly do they close them up. I have found it almost impracticable to prevent these persons, Germans particularly, from smoking tobacco, and I have often made use of this propensity

as a means of admitting fresh air into the wards, by overlooking the appearance of the tobacco-pipe, if its smell gave no very strong evidence of a stagnation of the air.

A very excellent mode of ventilation was adopted by the French in the Peninsular war, copied from their permanent military hospitals at home; viz. perforating the walls of each ward with two rows of conical tubes, about one foot in diameter at their largest end, and eight inches at their smaller, the larger diameters towards the inside of the ward; one row on a level with the floor, the other with the ceiling, at the distance of from ten to fifteen feet from each other, and so distributed, that the tubes of the upper or ceiling row correspond with the unbored space of the lower range.* By these means, or by leaving vacancies in the glass of the windows, so shaded over as to prevent the entrance of rain, as in many of our manufactories at home, we may, with great attention and strict watchfulness, ensure a certain freedom of circulation of air in the wards: but without taking the doors and windows off their hinges, or removing the panes from the latter, in crowded rooms, or hot weather, we can never promise to ourselves a complete and sufficient freedom in this respect. Closets, presses, cupboards, &c. so far from being useful in the wards of a hospital, I have always found a serious disadvantage. They occupy a large space, and thus diminish the quantity of air; they obstruct its free circulation if they project into the wards; in the very best hospitals they favour the accumulation of filth; and in but too many they are not only favourable to its increase, but to its concealment; foul linen, old bandages, remnants of bread and meat, and even more offensive materials, are often thrown aside in them, by lazy, drunken, or peculating servants. Where they can possibly be removed it ought to be done, but if they form an integral part of the building, they should be kept always open, their doors should be removed, and their contents (if any are allowed) should be always placed within view. Shelves are liable to the same objections as close closets. Tables and forms are much more suitable for the purposes of holding food or medicines.

Great additional ventilation, and increased facilities for detecting and removing filth, will always be gained by fixing the beds *at least* one foot from the walls of the ward, so as to admit of a complete passage round them; and the higher the bed-

* The principle of this plan was acted upon, in 1761, at Bremen, by Dr. Monro, though not to the extent here recommended. He cut holes in the lower part of the door, and one in the corner of each window; the cold air rushed in by the former, and the heated escaped by the latter. See Observations on preserving the Health of Soldiers, 2nd edit. vol. i. p. 101. In the Mémoirs of the Academy of Sciences for 1780, is a paper by M. Le Roy, in which this principle is elucidated fully, p. 598.

stead, or boards and tressels, are from the ground, so much the greater advantage do we acquire in these essential points.* A very simple means of ventilation has been proposed by Dr. Van Marum, and may be employed under many circumstances, viz. suspending a common argand lamp from the roof of a ward, and keeping it burning under a funnel which communicates with the open air, or rises above the roof, with a ventilator fixed to its end; indeed, the power of fire in confined places is one of the most efficacious means of ventilation, and should always be had recourse to. A still more simple method than that just mentioned of availing ourselves of the effects of fire, is to perforate a hole into the flue of a chimney, a few inches below the ceiling, when, on lighting the fires, two strong currents are established, one through the ordinary, and one through the newly formed passage. Still, with all our endeavours, we but too often fail in preserving the purity of the air of our wards. Whether it may proceed from the chemical changes it undergoes, or from the admixture of animal effluvia, or from the change in its electrical qualities, from a positive to a negative state, as shown by the experiments of Mr. Reid,† certain it is, that the air, loaded with the exhalations from the human body, requires, for its effectual removal, a very strong and fresh current directed from the windward, so as to sweep every part of the room.

We are often so circumstanced, that we are obliged to lay our patients on the ground, either on paillasse cases, or sheets sewed together to serve as such, filled with straw or other materials; and the urgency of circumstances sometimes compels us to lay them on loose straw, or even the bare floor. In all these circumstances the most rigorous attention should be paid to ventilation and cleanliness. The patients should be allowed as much room between each other as possible; the loose straw should be formed into mats, or made up into light trusses, and not allowed to be laid down in corners, or close to the walls or partitions; the site of the bed should be shifted as frequently as possible, and the straw removed and burned.

Every effort on the part of the medical officers should be used to procure boards and tressels, or other temporary means

* The heads, and not the sides of the bedsteads, should be turned towards the walls, where the breadth of a ward admits of it. In long narrow passages this cannot always be done.

† See Philosophical Transactions for 1794, vol. lxxxiv. p. 266. Some very important observations will also be found on the ventilation of hospitals, in the Proceedings of the Board of Health of Manchester, published in 1805; in the works of Count Rumford; in the works of Monro and Brocklesby; and in a paper by Sir George Paul in the 19th volume of the Transactions of the Society of Arts and Manufactures. In permanent establishments, the ingenuity of the artist and the philosopher can have full scope; but simple means, applicable in all situations, are what the army surgeon requires, and what he should be prepared for, by consulting the best works on the subject.

of removing the beds from the surface of the floor; for, independently of the comfort and cleanliness, and the prevention of damp, it is a fact now well known in military hospitals, that the lower portion of the atmosphere of the occupied wards is invariably the least proper for respiration, and that in which sores heal most slowly.

To establish this proposition in an unanswerable manner, M. Brugmans resorted to chemical agents. The results were, that even in the best regulated and constructed hospitals, and in which no case of hospital gangrene exists, the layer of air nearest the floor contains a larger proportion of carbonic acid gas than that of the higher parts of the same ward. At the height of two feet, sometimes even two feet and a half, the proportion of carbonic acid gas is commonly $\frac{8}{100}$ to $\frac{12}{100}$, and close to the floor, $\frac{20}{100}$; and even a larger proportion has been observed. The flame of a candle, made to approach the floor, visibly fades; and lime-water, in an open vessel, rapidly becomes opaque.*

A great aid to the cleanliness of a hospital, is the selection of a proper apartment or gallery, in the vicinity of the kitchen, for the purpose of messing; or tents may be employed for the same purpose. Indeed, a supply of these articles is of the most serious import in a hospital, as all cases of fever, contagious diseases, or those peculiarly requiring seclusion, may be promptly and effectually removed into them from the wards.

Whatever may be the extent of our accommodation, it ought to be formed into three grand divisions, which may be larger or smaller as circumstances demand; viz. the surgical, the medical, and the convalescent branches; the two latter, of course, will not be so urgently wanted immediately after an action or series of field movements as the first; but they should be held in view, as ultimately of great consequence towards the safe conduct of the medical part of the campaign.

I would recommend it also as a general rule, never to open several hospitals for the reception of the wounded at the same time, although we should always have them ready prepared for such an event; but always to permit one to be tenanted, and its officers appointed to their several duties, before we commence upon another. The attention of the medical and purveying of-

* See "Annales de Litterature, &c." par MM. Kluyskens et Kesteloot, Vol. xix. or Nos. 106 and 107, where a paper of considerable interest is given by Professor Brugmans of Leyden, which contains a very valuable addition to our knowledge of the state of the atmosphere in military hospitals, whether under ordinary circumstances, or the dreadful infliction of contagious gangrene. I have not repeated the professor's experiments, but I have observed, on various occasions, a general improvement of the wounds and ulcers take place in the military hospitals, after a supply of boards and tressels, or other means of elevating the beds from the floors. The same has been observed on board the hospital ship, on the coast of Egypt, by my friend Dr. Dickson of Clifton, in patients elevated above the decks.

ficers is thus directed to one object only at a time; and when a hospital is once put upon the proper establishment, without being confused by additional admissions, the business will go on with the utmost regularity. On the same principle, wards, subdivisions, and divisions, ought all to be completed before others are opened. The size of the ward will entirely depend upon the nature of the building employed as a hospital. One hundred beds, however, are amply sufficient to form a subdivision, and as many as one assistant in ordinary cases can possibly manage, even if of the slightest nature.—To this there should be one ward master and six orderly men at least. The employment of females is one of the greatest sources of irregularity in a hospital; every species of excess, idleness, and plunder, is carried on under their auspices.

In accommodating the wounded officers, if a hospital can be procured for them, which is a matter of high importance,* the same systematic arrangement may be easily adopted; but, at all events, certain streets or sections of a town or city ought to be solely appropriated for their reception. Without some arrangement of this kind, inconceivable difficulties will arise in administering to them the necessary professional assistance, as I have painfully experienced on more than one occasion. Much is to be conceded to the peevishness of sickness, and much to the habits of command in which officers have been educated; but with every allowance for their sufferings and their rank, the attending professional man, especially if of a junior class, will have much to bear; and, with great respect for the valour and honour of British officers, I am forced in justice and candour to say, that in some instances I have observed, that the most slightly injured, and the lowest in rank, have been often the most troublesome and unreasonable; and I have heard the medical officers reprobated in the most insulting terms for non-attendance at specific hours, upon the very individuals whom I have known to be the most constant frequenters of the gaming table and the brothel. A false delicacy in those cases is sure to be followed by calumny and complaint; and the medical attendant should at once inform the senior medical officer, and respectfully submit his reasons for declining farther responsibility without proper investigation.

The fixed hospital being ready prepared, the compound fractures should all be first removed, and placed in airy wards, either on the first floor, or in those apartments easiest of access. They should be classed according as the upper or lower extremities, or their joints, may have suffered, and as the upper or lower portion of each individual limb may be implicated; so as that

* For some practical remarks on this subject, see a pamphlet by Dr. Faulkner, on the Expediency of a Hospital for Officers.

all cases of a similar nature may be near each other, and the men of the same corps brought together as much as possible.

The same classification and general arrangement should be pursued in the wounds and injuries of the head, neck, breast, abdomen, pelvis, and extremities. The labours of the medical officers, whether purely professional, or as referring to the construction of the necessary returns, are thus seriously abridged, and the due attendance upon the wounded accelerated and assisted.

We shall now suppose our hospitals filled, our patients laid comfortably in their beds, their diets regulated, and the whole machine in motion. The diet table, as now in use in the British hospitals, is admirably calculated to ensure a sufficient supply of nourishment to the soldier; and the privilege of allowing some extra articles to those on the lowest rates, *if not abused*, must effectually meet every dietetic want. There is no point in which a young practitioner is so apt to be deceived, or in which his humanity may so often lead him astray, as in this. The fewer extra articles, therefore, that he orders, he may rest assured, the better for his patients. To prevent all mistakes, the diet should be regularly marked by his own hand at the bed-side; and if wine or spirits are allowed, they should be invariably given under his own eye, or mixed with his patient's medicine.

It is obvious, that whatever arrangements facilitate the execution of the duties, must ultimately benefit the wounded; and a conscientious officer will employ the time saved to him in this way, in redoubled exertions for the advantage of those committed to his care, and will endeavour to identify his own comfort and convenience with that of his patient. Punctuality of attendance, preparing dressings and medicines in the intervals of the visits, and a regular registration of cases, will enable any man of common industry to acquit himself with credit in his situation; while men with the purest and most scientific views, without these mechanical helps, exhaust their strength, and redouble their toil.

CHAPTER IV.

DRESSINGS AND GENERAL MEDICAL TREATMENT.

THERE is no urgent necessity for removing the dressings which have been applied in the field to the more simple wounds of the extremities, for the first two or three days, whether the wounded have arrived in the hospital, or are only on their passage to it, provided the slips of plaster and bandage are sufficiently secure, the dressings unstained by a sordid bloody oozing, or no serious stiffness or uneasiness is perceived in the part by the patient himself. In this, however, we must be guided by season, climate, and the constitution of the individual, or the peculiarity of his wound. It will generally be sufficient to keep the dressings moistened with cold water, either alone or mixed with a little spirits, vinegar, or wine; or, if the weather demands, and convenience on the march permits, the same moderately warmed. As soon as possible after this period, the field dressings should be removed, and the limb either covered with cloths, moistened with an appropriate liquid, or laid in emollient poultices moderately warm. It has of late years become a fashion to decry the application of poultices, and to dwell on the harm they *may* produce, putting entirely out of view the essential service that we actually derive from them; but, after long experience on this point, and judging from the feelings of the patients themselves, and the obvious effects upon their wounds, I have no hesitation in saying, that a soft and moderately warm poultice of bread, meal, bran, pumpkin, carrot, or any other emollient substance, carefully applied, and removed at least twice a day, until the sloughs begin to loosen at the edges, and purulent oozing is seen issuing from under them—in fine, till the process of suppuration is fairly commenced, is the best and most appropriate remedy in the early stages of simple gunshot wounds, attended with much contusion of the soft parts, and high inflammation.* They should not be continued after this period, nor should they at any time be applied, except under the direction of the attending surgeon. It is to the abuse of continuing poultices day after day, indis-

* The time of the separation of the sloughs or eschars is quite uncertain. Rivoton supposed, that in the sanguine, and people of fair complexion, they separated from the fifth to the eighth day, and in the brown and melancholic, from the tenth to the fifteenth. The fact is, they separate sooner or later, according to the rapidity with which healthy suppuration is produced.

erminately to all states and stages of wounds, that their rejection by many is to be attributed, and that their bad effects are due. If the inflammatory symptoms do not run very high, and that the sloughs are beginning to separate kindly, a pledget spread with any simple ointment, or merely dipped in oil, and covered with cloths moistened in acidulated water, will be quite sufficient as an external application; while the general state of the system should be cautiously attended to in all cases. Compresses dipped in simple cold water have lately been much recommended by Kern* and Assalini, as a substitute for almost all other dressings; and I have seen them employed with considerable advantage. Where this plan is adopted, oil-skins should be employed at the same time, otherwise the beds get saturated with moisture, and severe pulmonary attacks, or rheumatism, may ensue.

The history of the employment of water as a dressing to wounds is curious and instructive. Soon after the introduction of gunpowder, it became a common remedy among the Italians; but they did not conceive it to possess any medicinal powers, until it had undergone certain mysterious and magical ceremonies; so that it long remained in the hands of quacks and medical conjurors, although Blondus published an essay on its efficacy, at Venice, in 1542, under the title “*De Medicamento Aquæ nuper invento et De partibus ictu sclopeti sectis;*” and Gabriel Fallopius, Felix Palatius, Joubert, and Martel, all followed upon the same subject, between the year 1560 and the beginning of the following century. Joubert directs the water to be used, “*sans aucun prononcement de verbis metaphoriques, ni sur icelle, ni sur les drapeaux et charpies;*” and Martel, with a discrimination rarely to be found even in latter times, says, “*Je pense qu'un des principaux moyens pour haster le geurison des playes est de les tenir bien nettes; or est il que l'eau les netoye et deterge bien fort. L'eau par sa froideur empesche l'inflammation, tempere l'ardeur des humeurs,*” &c. (*Apologie pour les Chirurgiens. Lyon, 1601.*) Notwithstanding these enlightened views, cold water never came into general favour; and it must be confessed, that if there existed gross deceptions among the quacks, there were also gross prejudices among the regulars; for although they could not deny that wounds were healed under the employment of water solely, many of them affected to attribute this consequence to arts magic and unchristian, and therefore continued to scald their patients with boiling hot oil, or to grease them with a composition of whelps stewed down alive; indeed, it is question-

* *Avis Aux Chirurgiens sur les Pansemens de Blessés, Vienne, 1809.* See also the Observations of Mr. Guthrie on this subject, in the chapter on Simple Gunshot Wounds, in his last edition.

able whether a patient, with any pretensions to piety, would have submitted to the employment of the simple element, labouring, as it then did, under the anathema of the church. Without asserting that water is infallible, we must acknowledge that it is often highly useful, and that, with the precautions already mentioned, the surgeon can never be at a loss for a remedy which is seldom injurious, and rarely, if ever, interferes with the efforts of nature.*

Few subjects bear free and full purging better than soldiers; and, under certain limitations, they are equally tolerant of the lancet. Great prejudice exists among some of the younger surgeons on the subject of phlebotomy, as applied to soldiers; they have some idea that this class of men cannot bear evacuations, particularly of that kind, so well as the lower orders in civil life: but the very reverse is the fact; their whole plan of diet, exercise, &c., or, as it is termed, the non-naturals, tends to carry their system to the highest possible pitch of vigour, (I, of course, am speaking of the effective bayonets;) and the daily practice of our hospital proves, that the recruit just taken from the plough with all the appearance of health, which a ruddy countenance and a corpulent person can convey, will not bear the lancet nearly so well as the same individual in a few months after having been accustomed to the fare and mode of living of a soldier. I have almost daily instances, in the hospitals under my inspection, illustrative of this fact, where blood has been drawn, for severe inflammations of the lungs, and other viscera, to an extent, one-third of which would probably have sunk the patients beyond recovery a few months before, when employed as day-labourers or mechanics.

Few, if any, of the veterans are without either confirmed hepatic affections, or a strong tendency to them; and it has never fallen to my lot to see any class regular in their mode of diet, without the strictest enforcement of rigid discipline. Hence frequent derangements of the chylopoietic organs, and strongly marked determination to the head and breast, where the least access is allowed to spirituous or vinous potations; or where the frequent long fasts and the irregular system of cookery, unavoidable in severe marches and grand movements, are succeeded by the plenty of victory; in which cases, by the mistaken kindness of their comrades in the hospitals, or on the journey to them, the wounded are often gorged with food and intoxicating liquors; a practice which, for the first few

* Baron Percy has given a valuable notice on the surgical employment of cold water, in the article "Eau," in the "Dictionnaire des Sciences Medicales," from which I have quoted the words of Joubert and Martel, whose works are exceedingly rare.

days, no precaution can altogether prevent. It should never be forgotten that the state of the stomach and bowels has a remarkable influence upon the discharge from a wound, and is in turn influenced by it; a degeneration of the discharge and a deranged state of the intestines being almost always inseparably connected; and very frequently the approach of a change for the worse in the wound, may be prognosticated some time before its actual accession, by the torpor or relaxation of the intestinal canal, and the depraved quality of its contents.*

The state of the skin is also an object of particular consequence in preventing or moderating fever; and in this view the antimonial preparations will be found of the most essential service, administered either in the aqua ammon. acet., or in an anodyne draught, if severe pain and spasmodic twitchings about the wound render opiates necessary. In ordinary cases, however, I would recommend the sparing use of opiates; and in the more severe, particularly if attended with fractures, we should always reserve them to the latter part of the cure, when they become so indispensably necessary. Where a temporary lowering of the system is an object of importance, and the use of the lancet is to be restricted, nothing is more effectual than nauseating doses of the antimonial class. It must also be kept in view, that, independently of the symptomatic fever which more or less attends all wounds, men labouring under them, and crowded together in large hospitals, are particularly subject to the prevailing diseases of the country where they serve, even though they may be complete *acclimates*; their irritable and debilitated state rendering them particularly obnoxious to every species of contagious affection, common among the inhabitants, and to some peculiar to themselves.

When the parts are brought into free suppuration, great attention becomes necessary in the dressings, to prevent the formation of sinuses, by the proper application of pressure with compresses and bandage, by carefully removing all stagnant purulent matter, and, if occasion requires, facilitating its evacuation by a regulated use of the bistoury in the enlargement of particular points, or by the forming of counter openings; by the removal of all the loose sloughs and extraneous bodies which we have not been able to effect on the field or at subsequent dressings; and, finally, by carefully continuing every means which may restore the healthy action of the system. It is under the strong fasciæ of the thigh and arm, and

* Among modern authors on this subject, I would particularly refer to the works of Hamilton and Abernethy; but the observation did not escape the illustrious Boerhaave, who published his Thesis in 1693 at Leyden, upon the utility of inspecting the evacuations of the sick.

among their long muscles, and in wounds about the back and loins, that we have particularly to dread the formation of sinuses: but if, in spite of all our endeavours, they do form, we should not trust to pressure, but at once have recourse to the knife, for which no adequate substitute can be found, either in the mechanical or chemical stimulants of the seton, or injection. Here, and here principally, it is that scarifications are truly useful; and in such cases they merit all the praise that their indiscriminate admirers have bestowed upon them.

In the tumefaction also of the muscular parts of the extremities, confined by strong fasciæ, which are attended with great pain and high fever, a prudent use of the knife will be of essential service; inasmuch as, by removing the strictured state of the parts, suppuration is prevented, or, if it has taken place, a free exit is given to the matter, and its insinuation among the interstices of the muscles is obviated. But the trifling and superficial scratches often made at the orifices of shot-holes are entirely useless, and scarcely ever attempted by surgeons of experience. As the following case shows the inutility of the one and the great advantages of the other, I select it from many others of a similar nature in illustration of this fact.

CASE I.

Illustration of the Effects of Scarification.

A sergeant of dragoons was shot through the external part of the thigh at Waterloo, and was dressed for the first week by a Belgic surgeon. The lips of each orifice, which were plugged up with charpie, had been scarified in a radiated manner to about half an inch deep, as he said; but were nearly healed on my seeing him. Shortly after, heat, pain, and tumefaction took place in the limb, attended with considerable fever and great derangement of the head and stomach. This at last proceeded to such a degree, that the assistants requested me again to examine him, which I did on the 14th day. I found one orifice still open, and that some superficial scarifications had been repeated, and the limb fomented, but without effect; it was extremely tense, hot, and painful to the touch; it could not be moved without great uneasiness; the lower part of the limb, from the knee down, was œdematosus, while the thigh itself was swollen up to the external trochanter; interiorly it was least so, but rather puffy. I made a long and deep incision from the trochanter nearly down to the knee, completely through the fascia, and about the centre of the limb I dipped almost to the bone. So far from this occasioning pain, the man begged

mc to go on; and, although there was but a very slight discharge of matter from the wound, he felt easier within an hour.* The bleeding from the part was encouraged by warm fomentations; and in five days the sergeant was able to walk about, and was soon after discharged convalescent.

The knife, as we have already seen, is often indispensable in our search after balls, splinters, and bleeding vessels. It is also highly useful in relieving the strictured state of the parts tied down by fasciæ, when that stricture is forming, or formed, but neither does the stricture form in all cases, nor does early scarification prevent it, because the tumefaction depending upon violence of injury, locality, and circumstances of constitution and treatment, the scarified parts may, and often do, heal before the occurrence of the contingency for which it has been employed. I have often seen repeated scarifications "in expectation," if I may so call them, performed on individuals who never required them, and several on individuals some days, and even weeks, before they were required, and although the parts often wonderfully sustain these repeated cuttings, I have occasionally seen them rendered highly irritable, and sometimes callous.†

It may not be amiss to observe, (although I have rarely met with the case myself,) that on some occasions a herniary protrusion of the muscles takes place after extensive slitting of the fasciæ, or removal of these coverings by contusion or sloughing; a supporting bandage, with occasional adhesive straps, is the only plan that I should recommend on such occasions, together with such a position of the limb as may favour the return of the muscles to their natural situation.‡

The labours of the medical officer will be much abridged in the necessary duty of dressing, if, in addition to his tray, furnished with ready prepared dressings and common formulæ of medicines, he provides a portable camp stool, to sit at ease by his patient's bed-side while dressing; for, without this, or some such relief, if the beds are on a low platform, or on the floor, and the cases of a nature which require long attention, as in compound fractures, he will be exhausted before half the labour

* The effusion occasioned by tight bandaging, or by stricture on the parts from their being bound down by the fasciæ, never is followed by a healthy suppuration, but by a burrowing and destruction of the parts. This is very strongly illustrated in cases of paronychia.

† It was with great pleasure that I found, by a communication from Dr. Jackson, whose indefatigable labours in the medical department of the army are so well known, that the remarks I have made on scarifications, poultices, &c. are conformable to his experience, an account of which he published so long since as 1790, in a paper in the "London Medical Journal," vol. xi. p. 363. See also Botallus, chap. ii. and Hunter, chap. ii. On the other hand, Perey, Larrey, and all the French surgeons, strongly recommend the practice.

‡ See Report by Dr. Thomson, p. 125.

of the day is finished. To these should be added a basket for the reception of all the old filthy dressings, and an oil-skin to preserve the bedding from wet, and purulent matter or blood. Without these little aids the young surgeon will be seriously embarrassed on his first appearance in a military hospital after an influx of wounded.

A great deal of confusion and filth will also be saved, if, at the early morning visit, all the slighter cases, and those not confined to bed are ordered into the open air or a tent, and there dressed, and on no occasion permitted to lounge in the wards, or lie on their beds with their clothes or shoes on.

If the patient cannot sit up in bed, the oil-skin must be placed under the limb, and the former dressings gently moistened by a sponge and warm water, and then carefully withdrawn, the refuse poultices, lint, &c. thrown into a bucket or basket for removal, and the soiled roller laid aside for the purpose of being washed for subsequent use. All filth must now be attentively removed from the surface or lips of the sore; if it is a stump or point where a vessel has been tied, if long ligatures are left, they must be very cautiously handled; if adhesive straps have been used, they must be taken off one by one. Gentle pressure must be made all round to bring away any concealed matter; and if abscesses are formed, they should be opened on the spot. The fresh dressings must now be applied without any unnecessary delay, all their loose edges and redundancies removed, and a neatness and even nicety of shape observed in the straps and dossils, which though we ourselves know not to be essential, weigh amazingly with the patients and attendants. In the application of the roller, however, nicety *is essential*, as on its due employment the removal of existing evils, and the prevention of many more entirely depend. As a support to parts requiring approximation or separation; as preventing the insinuation of matter, blood, or serum, among the interstitial spaces; as expelling them and preventing their re-accumulation when formed; as repressing redundant or protruding growths, or stimulating their absorption; and, finally, as retaining other applications in contact to the parts—too much attention can scarcely be paid to the application of the roller: and yet candour compels me to say, that foreigners of almost all countries excel us in this fundamental part of our art. Our young students may study, philosophize, and reason well; but neither books, reflection, nor arguments, will teach the application of a bandage, without repeated practice.

The most judicious medical treatment and the ablest surgical operation will fail, if not assisted by good bandaging; and errors in both will soon be recovered, if a proper system is adopted. I have seen innumerable instances of most promising

stumps degenerating in a few days under an inefficient or careless dresser; and I have even traced some deaths to such a cause; while rapid amendment and the saving of a limb often result from the due use of a proper system of dressing and applying the roller.

Escharotics, so useful under certain circumstances, are frequently grossly abused; and an insensibility, or sometimes very high morbid irritability of parts induced by them. In simple cases of redundant or luxuriant granulations, a little scraped lint with pressure from a compress, will be found quite sufficient for their removal; and the same will accelerate the skinning of a wound, as well as lunar caustic, or cupreous solutions; with these two last, old soldiers are well acquainted, and they should never be trusted with their use. In no instance either, should the orderly men or the patients themselves be permitted to apply the dressings or rollers; and at the time of dressing, all the necessary prescriptions should be administered, and all the minor operations, as bleeding, &c. performed. I should not do justice to this part of my subject, did I not refer to the excellent observations to be found in Professor Thomson's Lectures on Inflammation, on the management of Dressings, and, above all, did I not particularly recommend a mild and humane demeanor to the dresser.* The soldier, who is so fierce in the field and so submissive in the operation room, becomes a most fretful being under the smarting of his wounds; and he frequently looks upon our best directed endeavours for his relief as only experiments upon his fortitude. I am sorry to say, that I have but too often seen surgeons, even of high rank and long experience, yielding to a prudence for operation, take up the knife, the forceps and the probe, on every opportunity, and handle in the most inconsiderate manner even the fractured limbs of their patients.

* Lectures on Inflammation, by John Thomson, M. D. Edinb. 1813, p. 294. See also a Letter, by Dr. D'cwar, upon a particular State of Gunshot Wounds, addressed to Staff-Surgeon Boggie, Edinb. 1815. A paper on the subject is also to be found in the Medico-Chirurgical Transactions, vol. vii. p. 482, Part ii. by the same author.

CHAPTER V.

EXTRACTION OF FOREIGN BODIES.

WE have sufficient occasion, in the course of a surgical campaign, for the use of our whole Arnamentum Chirurgicum, without having recourse to superfluous scarifications and pokings; and even under the most judicious employment of instruments, we are frequently foiled in our intentions, particularly in the extraction of foreign bodies; which, by the violence and rapidity with which they have been forced into the living solids, sometimes take very unusual and deep-seated routes, not at all to be accounted for by any preconceived theories drawn from the doctrines of projectiles, nor to be explained by diagrams founded upon mathematical rules.

A recollection, however, of the texture of the different parts through which the ball may pass, and a comparison of its firmness, its soft or its elastic nature, conjoined with that of the general doctrine of projectiles, will be no mean assistance to our judgment in forming an opinion of the probable course of a ball.

The older surgeons were sadly puzzled on the subject of the extraction of foreign bodies, and had, as usual, recourse to magic, to prayers, and to charms, when their prepared load-stones and rude *tire-bals* failed.* The natural anxiety which every wounded man feels to have the supposed cause of his pain removed, and the praises which he and his friends so liberally bestow on a successful operation, have, at all times, made surgeons anxious in the invention of those very ingenious and very useless articles, bullet extractors, the employment of which is completely superseded by the common forceps; or still more by that of M. Percy, used with a little ingenuity; for wherever a bulky and complicated bullet ex-

* Those who have neither leisure nor opportunity to consult the original authors, will find a very learned and satisfactory account of the means used by the older surgeons for the extraction of foreign bodies in the "Tableau rapide des differens instruments," &c. by M. Percy, in his "Manual du Chirurgien d'Armée;" and a very good summary account of their superstitious and peculiar notions concerning wounds, will be found in the "Liber Quintus Practicæ Medicinæ, Pars Quarta," of Daniel Sennertus, under the heads, "De Rebus alienis è vulnere eximendis;" "De Cæsaris Magati et Ludovici Septalii curandi vulnera methodo judicium;" "De sclopotorum vulneribus;" "De unguento armario;" and above all, in his twenty-fourth chapter, part iv. where the following question is fully debated: "An liceat Christiano periaptis et sigillis appendi, vel similibus modis, sc ab armis inviolabilem prestat?" See also Parc's Works, lib. ii.

tractor can enter, the former instruments can go down with infinitely greater ease; but, unfortunately for both instruments, we most require their mechanical power in tortuous passages, or deep curved and angular cavities, where we can least make use of them.

The great point is to discover where the extraneous matter lies; and he must possess very little manual dexterity indeed, who cannot remove it from the soft parts, if the removal is advisable. These bodies naturally divide themselves, first, into the inflicting body itself, or the articles attached to it; secondly, substances forced in with the inflicting body; thirdly, component parts of the limb or organ wounded, but which have been rendered extraneous by their total or partial death. All these may be found either in or near the wounds themselves; or by their gravitation, by muscular action, or by other causes, may have been carried from their original situation, and deposited in or near other distant organs.

Balls of every kind, from the smallest carbine bore to that of a field piece, surrounded with cartridge paper or flannel, and pieces of shell from the most minute size up to the weight of several ounces, are daily instances of the first class. To these may be added, though of less frequent occurrence, bayonet and sword points, lance heads, &c. To the second class are referrible, pieces of clothing, buttons, coins, parts of breast-plates, of watches, their chains and seals, keys, and all the different contents of a man's own pocket, or of the pocket of a near comrade; splinters of wood, stones, earth, &c. In the last class, which are by far the most troublesome and dangerous, are included splinters of bone of all sizes, coagula, and sloughs. It may be asked, how can such large masses possibly be contained in a limb, or lie among muscles without being betrayed by their bulk? The explanation is not difficult; the immense rapidity with which they are propelled not only forces them into the soft parts, but compacts these parts closely together, while the space they originally occupied is filled by the projected body. The elasticity also of the parts allows of substances of a very large size to pass in without the external entrance in any degree corresponding to the size of the body: thus musket balls are often found to leave only traces of an orifice which admits little more than a common sized bougie, and I have seen grape extracted from an orifice which before its enlargement, was not a fourth part of the diameter of the ball. The orifice is also still farther contracted by the swelling which takes place, and the existence of a ball within, is frequently rendered more obscure by the absence of pain or any unusual sense of weight.

When, however, after some time the living fibre recovers

sufficient tone, the natural tumefaction which necessarily precedes the throwing off the dead matter, soon produces such a degree of pain, as gives notice of the troublesome guest. Sometimes, where the constitution is less irritable, or the wounded parts possess but little sensibility, or where the foreign body is small and polished, or may have formed a secure bed for itself in the belly of a muscle, or in an interstitial space, no derangement whatever succeeds; and the part heals up as if no extraneous body were present. Masses of very extraordinary, and almost incredible sizes, are found in various parts of the body. I have frequently seen them of one, and sometimes of two pounds weight. Mr. Guthrie (p. 185) has seen a ball of eight pounds weight lodge in the thigh, without making a very large opening, and remain undiscovered until the limb was amputated, and then it rolled out. In the first edition of this work, I gave the case of Lieutenant F. an officer of the 12th regiment of infantry. I stated it as it appeared in the periodical papers of the day, and as it was related to me by many officers who served in India; but by the kindness of Dr. Kennedy of Edinburgh, formerly superintendant surgeon in the East India company's service, I am enabled to give a much more accurate account of it than I could possibly do at that time.

CASE II.

Cannon Ball lodged in the Thigh.

“The particulars of the wound,” says Dr. Kennedy, “by which Lieutenant F—, of his majesty's 12th regiment, was killed at the siege of Seringapatam, were stated to me a very few days afterwards, by the late Dr. Alexander Anderson, the superintending surgeon and chief medical officer of the army, as follows:—

“A shot from a heavy gun came rolling along the ground, like a spent ball, towards the trenches. It rolled over that part of the banquet under which Lieutenant F— happened to be lying down, and buried itself under the skin and muscles of his hip. He was immediately put into a dooly and carried to Dr. Anderson's tent. Upon laying down the dooly, the bearers complained of the difficulty they had found in carrying it from the trenches, owing to its having been unusually heavy on one side. Dr. Anderson, upon running his fingers into the wound, was surprised to find a mass of iron of such unusual size, that he concluded it must be part of a large shell which was lodged there. Lieutenant F— being then moribund,

the shot was not cut out till after he died, when it proved to be what Dr. Anderson called to me unequivocally a *thirty-two* pound shot. One circumstance only throws any doubt upon its having been actually a shot of this calibre, and it is this:— It was afterwards said that this shot had been fired from a gun very conspicuous, during the siege, both from its being mounted upon a high cavalier, and also from the mischief it did, and it was also said, that after the place was taken, this gun was found to be only a French twenty-four-pounder, which gives a calibre of nearly twenty-eight pounds English. Whether this shot which killed Lieutenant F—— was fired from this gun I do not know, but it is certain that a shot thrown from this very gun into the head quarter line, (which was an unusual distance,) and which lay during the rest of the siege near to Lord Harris's tent, was afterwards looked upon and spoken of as a thirty-two pound shot.”

The following cases are of a more ordinary kind, but are still interesting and instructive.

CASE III.

Grape-shot lodged in the Sole of the Foot.

A mounted officer was wounded, at the battle of Waterloo, by a grape-shot; it struck between his foot and stirrup; immense tumefaction of the parts, and an approach to gangrene, took place; no suspicion was entertained at the time that any foreign body was lodged, but on examination with a probe after the high inflammatory symptoms had subsided, a mass of metal, nearly as large as the closed fist, was extracted from under the plantar aponeurosis, by Dr. O'Beirne of the Royal Artillery; it was not weighed. By great attention to bandaging and position, the officer has recovered the use of the foot, and the loss of substance has been repaired.

CASE IV.

Grape-shot lodged in the Thigh.

A soldier of the 95th regiment received a wound from a grape-shot at the storming of Badajoz, which entered about the centre of the glutæi muscles of the right side, but without injuring the bones of the pelvis. Very violent inflammation and extensive sloughing took place, and the fever ran so high

that it was nearly five weeks before the patient was free from danger. At the end of that period, he complained of a sense of weight in the thigh of the left side; and, on examination, a slight discolouration and an obscure sense of fluctuation could be perceived. As every attempt at finding the ball had been vain, we began to hope that it had coursed round under the muscles, and lodged about the point where the uneasy sensation was felt. The man was therefore directed to lie, as much as possible, in a position favourable to its gravitation; and the part was fomented at intervals of four hours. On the second day after the adoption of this plan, evident fluctuation was felt, and a hard body, lying loose within the abscess could be distinguished when he was placed in a favourable posture; but whenever the limb was moved, it seemed to recede. On the third day a large ball was plainly felt, lying near the edge of the sartorius muscle, and apparently in contact with the femoral artery; but still receding from it if the position of the limb was changed. I now made a cautious puncture over the site of the ball, which was followed by the discharge of about a pound of very fetid matter, mixed with clots of blood, and a ball of large size could be felt by the probe and finger. The man fainted, and obstinately refused to permit any enlargement of the opening. As all fear of hæmorrhage from the artery was now over, he was ordered a glass of wine and water, an anodyne at night, and the application of a soft and warm cataplasm to the part. The next day he willingly submitted to a farther operation, when an incision being made along the edge of the sartorius muscle, the ball was extracted by one of my assistants with very little difficulty, and his recovery was, from that period, progressive. On examining the ball, it was found to be of iron, crusted over with canvas, and weighed eight ounces.

By the kindness of Staff-surgeon Brownrigg, I was afforded an opportunity of seeing the following case, which is detailed by Assistant-surgeon Reid, 25th regiment.

CASE V.

Splinter of Shell lodged in the Abdominal Muscles.

John Brown, private 2d battalion 1st foot guards, was wounded at Waterloo, on the 18th of June, 1815, by a fragment of a shell, which produced a considerable degree of laceration of the glutæi muscles of the right side, passed over the spine or semicircular edge of the ilium, and lodged itself between the

internal oblique and transverse muscles of the abdomen. The orifice of the wound, which was dressed with dry lint, soon assumed a healthy appearance, and showed a disposition to cicatrize; but as the patient's health gradually declined, and as he frequently complained of obtuse pain in his abdomen, accompanied by a sense of weight and pressure, there was reason to suspect that these complaints originated in some cause which had hitherto escaped detection. This idea was rendered more probable by the immense purulent discharge which issued from the wound, when the patient was turned on his right side; the integuments, however, of the abdomen still preserved their natural colour, and no hardness, swelling, or extraneous body was perceptible to the touch. Three weeks after the injury had been received, the patient informed me, when dressing his wound, that he felt a hard substance in his abdomen, which changed its place to a certain degree according to the position in which he placed himself. He was now visited by Dr. Thomson of Edinburgh, and by Mr. Brownrigg, surgeon to the forces, who agreed in opinion, that an incision should be made directly over the hard body alluded to, which was now distinctly perceptible to the touch, in the centre of the right lumbar region. An incision, four inches in length, and about half an inch in depth was accordingly made, which enabled the operator, Mr. Brownrigg, to discover and extract a piece of shell, of an irregularly quadrangular form, weighing nine ounces and a half avoirdupois, together with several small pieces of bone, which had been detached from the ilium. The wound was kept open by the insertion of dry lint, in order to promote the discharge from the cavity which had been formed by the piece of shell, and to excite the process of granulation in the contiguous surfaces. The discharge, which was purulent and healthy, from this time gradually diminished; and the patient's health and strength improved rapidly. On the 20th of August, the original wound on the ilium was completely cicatrized, and the purulent discharge from the incision was almost imperceptible. The patient's health was now quite good; and, from the favourable manner in which the cure proceeded, I have no doubt, but it was soon after completed.

CASE VI.

Pieces of Coin lodged in the Thigh.

A mounted staff-officer, in one of the actions previous to the decisive one at Waterloo, was knocked off his horse by a round shot, which carried away the arm close to the elbow, and in-

flicted a very extensive lacerated wound on the external part of the thigh of the same side. Amputation of the arm was performed as soon as he got within reach of medical aid, and the thigh was dressed, not without some fears upon the part of the surgeon, that amputation of it also would ultimately be necessary. In the great confusion, and frequent change of attendance, which the exigencies of the service required, the gentleman who operated was not able to continue his attendance, and I was sent for. I found the teguments and part of the fascia of the thigh, and subjacent muscles for about three hands' breadth, dreadfully lacerated, and in a highly irritable and sloughing state, with a thin, sanguous, fetid discharge; his skin hot and dry; his tongue covered with a whitish fur, particularly at the back part, and trembling when exposed to view; the epigastric region somewhat swollen, and tender to the touch; the eye suffused, and intolerant of light; the sensorium much confused, but when his mind was brought to any particular point, he would converse rationally for a few moments, though it was obviously with an effort.

I found, from his servant, that he had had no stool for two days, and what he had passed was described as very "filthy stuff." I ordered five grains of the mass of blue pill to be taken immediately, and, in the course of a few hours after, a solution of $\frac{3}{4}$ j. of sulphat of magnesia in $\frac{3}{8}$ of water, with $\frac{3}{4}$ j. of antimonial wine, which is the common purgative I use, in preference to more elaborate forms; occasionally adding an aromatic. He was directed to take a wine glassful every hour or oftener, until it operated. A large emollient cataplasm was at the same time ordered to the wound, and I left directions to give him an anodyne at night, with some antimonial wine, if the purgative should have sufficiently opened his bowels; and to have his skin well sponged with tepid water, and a little vinegar. His kind hostess implicitly obeyed all my directions; and in the morning I had the pleasure of finding all his symptoms much relieved: the skin was soft and cool; the pulse, which had been above 100, had sunk to 80; the tongue had become cleaner, and the discharge from the wound much more favourable; he had had several stools, of a blackish, pitchy, appearance, and intolerable fetor.

By the occasional use of the purgative mixture, with the antimonial anodyne at night, he was much amended in a few days; and at length, after suppuration had been fully established, Mr. Lorimer, the assistant who dressed the case, in cleaning the sore on the thigh, discovered an extraneous substance deeply imbedded in the vastus externus muscle, which, on removal, proved to be his pantaloon pocket, of coarse linen, containing two five-franc pieces and two small copper coins. I need

scarcely say, that, after such an injury, in a constitution debilitated by former severe wounds, the recovery was very slow, and the irritability excessive, although great relief was obtained from the extraction of those articles.

CASE VII.

Pieces of Coin lodged in the Thigh.

A Hanoverian soldier received a severe wound from a grape-shot on the 18th of June, 1815, at Waterloo, which struck him on the external part of the thigh, producing very extensive laceration. On the second day he was brought into the hospital, and the usual dressings were applied. On the fifth day a long narrow passage was discovered by the probe, seeming to run nearly the whole length of the *vastus externus* muscle. On cutting into this, three pieces of coin (which, from the very curious mode in which they were compacted together, I thought worthy of presenting to the director general of hospitals) were extracted from the parts. This poor fellow, a raw recruit, had no money whatever about him, nor even a pocket to contain it, and fervently protested against his right to this forced loan. He accounted for it by supposing that the money was carried from the pocket of his comrade, who stood before him in the ranks, and who was killed by the same shot which wounded him.

The coins, consisting of two five-franc pieces and a Dutch stiver, were obviously first struck by the shot, and carried along by it; for nearly one half of their flat surfaces, the silver pieces adhered closely together; on the other, where the ball had struck their edges, the metal was flattened out, and somewhat hollowed. In this hollow lay the copper coin, in some degree adapted to the shape of the depression on the larger pieces.

I cannot omit noticing here a trait strongly illustrative of the mobility of mind which characterizes soldiers, and their proneness to superstition and belief in omens, which a surgeon acquainted with their character can often turn to their benefit. The part of these two coins which had been flattened out happened to be that on which Napoleon's head was impressed. From one it was nearly effaced; and on observing this circumstance to the patient and his comrades, a universal burst of joy echoed through the ward; the young Hanoverian exulted in the share he conceived he had personally had of contributing to the downfall of the French emperor; his health rapidly improved, and I have no doubt that this simple circumstance produced a good effect upon every man who witnessed it.

CASE VIII.

Piece of a Cranium lodged in the Thigh.

A soldier of the 52d regiment was wounded at Badajoz by a ball, which carried off his arm. He lay for some time in the breach among the heaps of his wounded comrades, the enemy keeping up an incessant fire upon them. When brought into the hospital at Elvas, several fragments of the bones of a cranium were taken from a lacerated wound on his thigh.

CASE IX.

Piece of the Ulna and Olecranon lodged in the Bend of the Elbow.

A French officer of the German regiment of Nassau was wounded at the same siege; his fore arm was dreadfully lacerated, and, gangrene supervening, it became necessary to remove the limb above the joint. In the bend of the elbow a piece of bone was found, firmly imbedded; which, on examination, proved to be part of an ulna and olecranon of another person, that had been driven in by the ball.

CASE X.

Tooth lodged in the Temple.

On extracting a ragged angular musket ball from under the temporal fascia of a sergeant, who was wounded at Burgos, Staff-surgeon Hughes, then of the Portuguese service, felt what he supposed to be a bit of loose bone; but on withdrawing it with his forceps, it proved to be the body and crown of a bicuspid tooth of the soldier who stood a little in front of the sergeant, and who, wounded by the same ball, had almost all the teeth of the left side of the under jaw fractured and carried away.

Examples of this kind are still more frequent in naval actions, proceeding from the crowding and more irregular formation of the combatants; and some distinguished officers have been the subjects.*

* Admiral Duckworth, Sir Edward Berry.

It would be superfluous to give more instances of this kind, especially as I shall have to offer some others of a remarkable nature in treating of particular wounds. I shall therefore proceed to a few practical observations on the subject.

The experience of all ages has confirmed the dictates of common sense in giving the preference to the finger over all other instruments, for probing a wound. By a judicious tact, the state of the parts, and the nature and site of the extraneous matter, can be generally ascertained, and foreign bodies removed or brought within safe and easy reach of the dressing forceps, particularly in the limbs, where counter pressure will much assist us in bringing them forward more immediately to the point of the finger. In doing this, the limb should be relaxed, and put into a position favourable to the gravitation of the ball, &c. towards the surface, if it can be done without much pain; and if no serious inconvenience follows, the patient should be placed, as recommended by all the older surgeons, in the position in which he received the injury; but in many cases this is impracticable, and in none indispensable, although the practitioners of former days attached such value to it, that in some instances, if the wounded man happened unfortunately to be a trooper, they placed him on horseback to facilitate the extraction of the inflicting body!* Fully to answer every purpose expected from this plan, not only the posture of the wounded man, but that of his assailant, should be determined.

The surgeon should never omit a moderate search after extraneous bodies at every dressing, if he has evidence or suspicion of their being lodged in the wound. A casual visiter may, without this precaution, frequently snatch from him the praise due to a long and assiduous attention; for it not unfrequently happens, that, after the most particular and cautious search, some accidental movement of the patient, or some internal revolution in the wound,—either tumefaction or profuse flow of matter, will bring the substance lodged within our reach; nay, it is often spontaneously discharged, and found enveloped in the dressings or poultice.

It often happens also that extraneous bodies remain for years without inconveniencing the patient in the smallest degree; sometimes in the spot where they originally lodged; sometimes making occasional deviations, and at others taking such courses as are not at all to be anticipated, indeed often contrary to every calculation.

Authors abound with histories of extraneous bodies, present-

* See Gesner's "Observat. de Chirurgiæ dignitate et præstantia," as quoted by Wiseman, p. 324, fol. edit. Lond. 1705. Or the collection published by Gesner at Zurich, in 1555, which contains the treatise, and those of Maggius and Ferrius with many others.

ing at points not only different from that where they entered, but at points where they must have arrived, contrary to the laws of gravitation, and influenced only by the action of the muscles.* If they lie very deep (which smooth leaden balls are particularly apt to do) without giving pain, they ought never to be removed; when they come from their lurking places, and present at the skin, or near the surface, the extraction becomes a matter of great simplicity.

Except the ball or other foreign matter is completely in our power, we should never use the knife to enlarge the wound, or promise a certain extraction, however urgent the patient may be; for as nothing is more cheering than presenting him with the ball, so nothing is more disheartening, or tends more to shake his confidence in his medical attendants, than a disappointment under these circumstances.

Some useful information may be drawn from the appearance of the ball, as to the nature of the matter carried in by it, or of the injury it may have inflicted upon the bone. Shreds of cloth, the metallic particles of an epaulet, a piece of lace, of breast-plate, or other ornament, are frequently found solidly imbedded in it; and these appearances may lead us to a more certain knowledge of the existence of foreign matter in the wound.

Balls also are flattened out in various degrees, in proportion to the violence with which they strike a bone, and the shape and hardness of the bone itself. They are sometimes singularly elongated, and jammed in between bones which are naturally separated, or which they may have fractured; and their extraction is thus often rendered difficult and painful.

A leaden bullet also occasionally leaves a part of its own metallic composition in the wound, as it is frequently split, or cut to various depths against the sharp edge of a bone, as the tibia, vomer, &c. or against the remaining sound edge of the cranium after effecting a fracture in it: not unfrequently the fragment is found at a distant point, and sometimes in situations where no such event could be anticipated. The following case is a curious illustration of this fact.

* See, particularly in the *Philosophical Transactions*, abridged by Hutton, Shaw, and Pearson, vol. xii. p. 590, cases of pins swallowed, and discharged at the shoulder; and a needle in the left arm of a woman, discharged at the right breast, by Dr. Lysons of Gloucester. A case is given by Gasparetti, in his "Osservazioni," of a piece of glass, after nine years, shifting from one hand to the other; and numerous instances of articles swallowed, and passing out by the muscles, bladder, vagina, neck, and region of the liver, may be found in Valisneri, *Opera*, tom. i. p. 360, and by Silvy in *Memoires de la Société Médicale d'Emulation*, An. 5, p. 181.

CASE XI.

Fragment of Ball lodged on the Jugular Vein.

A soldier of the corps of Brunswick Oels, was struck at Waterloo by a musket ball on the tip of the nose, which split upon the bony edge where it is joined by the cartilage. A piece of the ball was extracted on the spot, and it was supposed that the ball itself had been purposely cut into pieces, as is sometimes done by foreign riflemen. The cure went on without accident until the tenth day, when the man was seized with a violent haemorrhage from the mouth and nose, which came on suddenly, and carried him off in the course of the night. On dissection, it appeared that a very minute portion of the ball had penetrated along the basis of the skull, lodged in the sinus of the left internal jugular vein, forming a sort of sac for itself close upon the vein, which, having inflamed the coats of the vessel, at last ulcerated and burst. This case occurred in the practice of my friend Dr. Pockels, now surgeon-in-chief of the troops of Brunswick.

Balls also sometimes split without being mechanically cut, possibly from a flaw in the casting. Thus, in a case to which I was called at Brussels, by my friend staff-surgeon Lindsay, he found a part of a ball lying in a fracture of the os frontis, which it had obviously struck directly in front, without at all interfering with the edges of the sound bone.—The case terminated successfully after the application of the trephine.

The process employed by nature for confining extraneous bodies in muscular parts, and cutting them off from the general system, is very simple. Their presence gives rise to irritation, inflammation, and thickening of the cellular substance, which forms a sac around; this sac is generally in contact with the extraneous body, a minute portion only of serous fluid bedewing its surface; occasionally, however, there is an increased secretion, and the extraneous body is moveable in its sac.* In bone, inflammation also takes place, but no *regular* boundary of osseous matter appears to be found. In the viscera the same process of thickening, as in the muscular parts, has been observed to occur, and even in the brain a sort of defined envelope has been found.

* In some cases which have come under the treatment of Mr. Guthrie, the sac was found to adhere so strongly to the ball, that it was necessary to remove a portion of it; in these cases the ball had been lodged for years. Guthrie's 2nd edit. on Simple Gunshot Wounds.

CHAPTER VI.

OF CONTUSIONS AND OTHER SERIOUS INJURIES FROM SHOT AND SHELL.

BESIDE those slight injuries effected by the passage or the lodgment of a ball or piece of shell, the most serious consequences at times result from them. These may be arranged under the heads of severe contusions or concussions, and their effects; fracture and disorganization of the bones and apparatus of the joints, and injuries of the blood-vessels and nerves, which are not of such a severe nature at first as to justify the removal of the limb.

It very often happens that while all is smooth and sound to the eye, or there is perhaps only a slight erosion of the skin, a very serious injury has been done to the subjacent parts. This is more particularly the case where a spent ball of large size grazes along any of the cavities; or where they have received a severe injury from the wheels of a gun, the explosion of an ammunition wagon, or other violence; on all these occasions, great advantage will be derived from taking a few ounces of blood from the arm, and embroating the contused part with some linimentum saponis, or any other mild stimulant. If the vitality of the part is not entirely destroyed, it will soon be relieved; but where that is the case, a circumscribed tumour, soft and pulpy to the feel, forms on the spot; the skin, at first of a natural colour, gradually assumes a dusky shining hue, and either sloughs off, leaving beneath a dark glossy flabby muscular mass, discharging tenacious bloody sanies; or else a chain of ill-conditioned abscesses forms, which soon run into one another, and burrow deep beneath the disorganized mass of skin and muscle, if not prevented by timely evacuation. There are two points to be most particularly attended to in these cases; first, the external application used as a discutient should neither be purely sedative nor powerfully exciting, but of a mildly stimulant nature; otherwise the whole surrounding parts will be overspread with an erysipelatous inflammation, and their vitality will be destroyed. Secondly, when the effusion of blood or formation of matter is clearly ascertained, it should be removed with the strictest attention to the rules of art, particularly as they regard smallness of aperture and cautious exposure to the air; otherwise an accident easily remedied by proper treatment in the beginning, may ultimately prove fatal. The following melancholy case will illustrate this:

CASE XII.

Fatal Contusion from a Cannon Ball.

A gallant artillery officer received a contusion from a spent round shot at the battle of Vittoria, which struck him exactly between the scapulæ, barely leaving a discoloration of the skin, and a slight stiffness of the parts. To this he was advised at first to apply cloths wet in a saturnine solution, which he gradually increased in strength. He derived, however, very little relief from this mode of treatment, the stiffness still continued, the discoloration increased, and he was advised by some casual visiter to apply a blister to the part. In an evil hour this advice was acceded to, and, in a very few days, the whole back, down to the lumbar region, was covered with a dusky erysipelatous inflammation. In a day or two after this appearance, an abscess formed on the part where the ball had struck, and another a few inches lower down, over the spinous processes of the vertebræ; the surgeon, who attended, unadvisedly laid open the tumour in its whole extent. I saw the patient in conjunction with Assistant-Surgeon O'Beirne, (who laterally took charge of the case,) on the thirtieth day from the receipt of the wound; he was then emaciated to a great degree, his pulse beyond 120, his skin hot and flushed, his tongue foul, appetite almost gone, and his strength so reduced that he could not sit up without support. On opening the wound, the smell was almost insupportable, and the discharge a thin, acrid sanies; the opening was of about four inches long, the edges hollow and flabby, the bottom smeared with a grayish, tenacious, purulent matter; through which, at different points, appeared dusky specks of muscular flesh, and some bits of tendon. At some points, the spinous processes of the vertebræ could be distinguished through a thin covering of this glairy fluid, and the angles of one of the scapulæ had eroded a hole through the skin which lay loose all around the sore for several inches: the destruction of the parts was evidently going on beneath, and a sort of bag, composed of the separated teguments, and filled with the same matter as besmeared the wound, was formed at its lower part near the sacrum, which the assistant had just punctured in a depending position, to prevent any farther accumulation. Under these desperate circumstances, little could be done; the constitution had almost sunk beyond the powers of art; it was resolved, however, to remove him from the hot and unwholesome air of Vittoria, by easy journeys, to the sea coast of Biscay, to which I was then proceeding on duty; to continue the infusion of bark, with the sulphuric acid,

which he had been for some time in the use of, and to dress the wounds with mildly stimulating applications. In spite of every effort for his preservation, layer after layer of muscle peeled away, till at last the whole surface of the sore became completely coated with masses of coagulated blood, oozing from the mouths of the vessels at all points; and in fifteen days death closed the scene.

In all cases of this kind, the parts struck by the ball or other body are, to a certain extent, deprived of their vitality, or even completely killed; and the principles of the cure are the same as those which guide us in the removal of a part in which death has occurred from any other cause. The cure is always slow, and the proper treatment consists in moderately stimulant external applications, as camphor, volatile alkili properly diluted, spirituous fomentations, &c.; and a liberal diet, wine, preparations of bark, and pure air.

To apply strong saturnine solutions, or leeches, to a part under these circumstances, is extremely injurious, because they tend to depress still more the powers of life; to overstimulate by blisters, is equally destructive of the vitality of the parts, and more hurtful to the general constitution.

The effects of severe blows by spent or oblique shots striking the head, thorax, and abdomen, are still more dangerous, both from the violent concussion they give the spinal marrow, and the different organs contained within those cavities, and the rupture of vessels, or the disorganization of the parts, which they produce; in which latter cases they are invariably fatal. This concussion is various in degree, proceeding progressively from the involuntary tremor and shuddering consequent on a flesh wound, to partial or universal spasm, sense of weight, numbness and cold, suppression of urine, involuntary stools, vomiting, jaundice, nervous tremors, great irregularity and lowness of spirits, (which, in some particularly irritable habits, cease only with life,) loss of hearing, sight, speech, and even of life itself when the head or spine are the parts peculiarly affected.

Under this class is to be ranged death from the wind of a ball, which has given rise to such a multiplicity of fables, and on which so much argument has been exhausted.* I should be very far from denying altogether the influence of the shock, whether that is electrical or not; because we frequently meet with cases where no local injury can be detected after death. That the compressed air alone, or the friction of the ball, has

* See some ingenious papers in the Edin. Med. Journ., vol. viii. pp. 1, 161, 310. Vacher, in Mem. de l'Acad. de Chirurg., &c. Sur quelques particularités concernant les playes faites par les armes à feu, tom. xi. 12mo. tom. iv. 4to.

no such effect, appears to me satisfactorily proved by the usual arguments, drawn from instances of near comrades being killed, or parts of the body torn off without the individual being destroyed; and it is rendered, if possible, still stronger by instances of escape, owing to a sudden contortion of the body, in the attempt of evading the summary military punishment inflicted in some foreign countries, by blowing men off from the mouth of a gun.

The two following cases are, I think, worth notice; death was occasioned in both by the same ball:

CASE XIII.

Death from an unknown Cause.

A slight lad, of about 14 years of age, was employed on a fatigue party at the fort of Puntales, in advance of Cadiz, when the enemy from the opposite fort of Matagorda, about 1000 paces distant, opened a very heavy fire. A 24lb. shot struck a sand-bag which he was carrying on his head towards a new traverse throwing up in the works; he immediately fell, and was brought to the barracks, about a mile distant, and placed in the hospital. On examination, no morbid appearances could be traced, except a derangement of the hair, extending along the sagittal suture, and about two inches wide, much resembling its appearance in a person placed on an insulated stool, and subjected to electricity. The pupil of one eye was considerably dilated; the other preserved its natural contractile power: his face was pale, his limbs cold, a clammy sweat bedewed his whole body, and he lay quite insensible; his pulse was soft, compressible, and reduced to 50 beats in the minute, but without any intermission: his breathing slow, but uniform, and without any stertor; his efforts to vomit were incessant, but frequently unavailing. In this state he remained for twenty-four hours, when he expired in a violent and general convulsion.

On first receiving the injury, he was bled, by an assistant on duty in the fort, to about sixteen ounces, and on his passage to the barracks he had lost some more blood by the loosening of the bandage. On his arrival some Madeira was forced down his throat, and was ordered to be continued to the quantity of a wine-glassful at intervals of two hours. On examination of the body, not the most trivial morbid appearance could be detected in the head, nor any derangement whatever in either the thorax or the abdomen, where I expected to discover the rupture of some large vessel, or severe injury of the liver, spleen, or some other viscus.

CASE XIV.

Rupture of the Vena Azygos and Intercostal Artery, from Contusion.

The same ball struck a soldier of the 30th regiment on the right breast, brushing along the pectoral muscles, but without raising the skin, or occasioning any fracture of the bones. He lay stunned for some minutes, and was then carried on a bearer to the general hospital. I had not an opportunity of seeing him that night; but the next evening I called at the "Hospicio," where I found him evidently dying; his face bloated, and of a purple hue; his eyes starting from their sockets, his respiration excessively rapid, and his pulse feeble and quick, almost beyond counting; in fact, he died thirty-six hours after the accident, with all the symptoms of suffocation. On examining the body, the vena azygos was found ruptured, and also the intercostal artery of the fourth rib of the injured side; and two pounds of blood were extravasated in the cavity of the thorax.

In many cases of death, both on the field and after arrival at the hospital, we find lesions of the liver, of the spleen,* or other abdominal viscera, and rupture of the mesenteric arteries, and sometimes of the intestines themselves, from the violence of concussion.

Frequently, where immediate death does not occur from the organic lesion, the inflammation runs so high as to bid defiance to medical means, and ulceration and subsequent effusions take place in the abdominal cavity.

I give the two following cases of severe contusions of the abdomen, (although they did not occur in the field of battle, nor in consequence of gunshot injury,) as they are sufficiently interesting in themselves, and as they are fully illustrative of the symptoms and most rational mode of treatment of these highly dangerous accidents, as well as of the morbid appearances on dissection. I owe these cases to my lamented friend Mr. Steel, late of the 23d dragoons. The first is in the words of the reports made at the bedside.

* See Morgagni, Letter 54th; Dr. Chisholm, in the Edinb. Med. and Surg. Journal for July 1811, vol. ii. p. 257. For a case of ruptured bladder, see Medical Communications, vol. ii. p. 284. For a dissection very soon after death, see the article Injuries of the Spleen, in the present work. See a case of Rupture of the Jejunum in a Child, occasioned by a fall from a chair, by Mr. Todd, in the Dublin Hospital Reports, vol. i. p. 311. Some remarks on Fractures of the Leg, Arm, and Fore Arm, see Cooper's Dictionary, p. 52, 450, 458, 471. 481, 488, 492, 493, &c.

CASE XV.

Contusion of the Abdomen and Ruptured Intestine.

Joseph Richmond, aged 21, was admitted into the hospital on the 28th of July, 1811, having, about an hour before, received a violent kick from his horse on the superior central part of the hypogastric region; he feels much pain in the part, and it bears a red mark corresponding with the shape of the horse's shoe; he is unable to void his urine, and it is probable, from the feel, that there is much of that liquid in the bladder. The catheter, therefore, was introduced with ease, and about twelve ounces of urine discharged, which was of the natural colour. He was bled to eighteen ounces, a saline purgative was ordered, and the abdomen was fomented assiduously with a decoction of chamomile.

Evening Visit.—The pain has been considerably relieved; and he has slept soundly since he was bled; his pulse is 80, and soft; he voided his urine naturally about an hour ago; he has vomited three or four times; he has not been purged. Let the bleeding be repeated to eighteen ounces; let him have a spoonful of liquor ammon acetat. every third hour, and barley-water ad libitum; continue the fomentation.

July 29th.—He was visited at nine o'clock last night, at which time he was suffering severely from acute shooting pains in the hypogastric and umbilical regions; his pulse was hard, and his bowels were constipated. He was bled to eighteen ounces; enemas were thrown up, and repeated until several copious evacuations by stool were produced, and the griping pains were relieved. He has had a return of the pain this morning: he is at present free from it; but there is considerable tension of the abdominal region: he has just had a copious evacuation by stool, of the natural appearance; he sometimes has an attack of vomiting; but it is not violent. Let him lose twenty-five ounces of blood, and continue his medicine and fomentation.

Evening Visit.—The pain in the abdominal region returned about noon, and has continued with considerable violence during the evening, and is at present very severe. The swelling, hardness, and tension of the abdomen, have increased considerably during the day; his pulse is intermitting, low, and tremulous; it is also very quick, his countenance has assumed a leaden hue; he has frequent retchings, and he sometimes vomits up a greenish-yellow matter; he is very restless and thirsty; he passes his urine freely; his stools are copious, and evacuated without difficulty. Let him be immediately put into a warm

bath; after which, let a blister be applied to the abdomen, and injection of decoction of linseed be thrown up every two hours.

Eight o'clock.—The warm bath produced a general diaphoresis, and an alleviation of the acute pain in the abdomen; the swelling and tension of the abdomen were also considerably reduced; his pulse, however, was not raised, and it continues very quick, weak, tremulous, and intermitting. His breathing is become short and laborious; he has had one evacuation by stool since he came out of the warm bath; he has had no return of vomiting since six o'clock. The pain having been relieved by the bath, the blister was not applied. He had just now taken half a pint of warm gruel, with about an ounce of wine and a little sugar: this is to be repeated every two hours, and the fomentation and glyster continued.

Ten o'clock.—During the last two hours he has laboured at the verge of dissolution; his breathing has been short and difficult, and his pulse imperceptible to the feel. The extremities have been cold; but the temperature of the rest of his body considerably above the natural standard: he has been exceedingly restless, anxious, and apprehensive; he has taken his panada regularly; has had some retching and frequent eructations; he has had one fit of vomiting, and he threw up at least two pints of green bilious matter. With a view of supporting the powers of life, the extreme prostration of which has been strongly indicated by the coldness of his extremities and the failure of his pulse, together with his anxiety and difficulty of breathing, he has taken a little volatile alkali and tincture of opium in small doses. The temples have been rubbed with liq. vol. c. c., which has also been applied to his nostrils. These remedies, with the occasional administration of panada, are ordered to be continued.

Eleven o'clock.—He is much worse in all respects; his pulse, during the last hour, could not be felt, and the coldness of his extremities has increased. His difficulty of breathing has also increased considerably; his countenance exhibits a deadly pale colour, and his lips are blue; he swallows with much difficulty, and his anxiety is extreme; the pulsations of the temporal artery can be felt; it is at 120, low, and feeble. At twelve he died.

Appearances on dissection, July 30th.—The abdomen having been opened by a crucial incision, the first remarkable circumstance which presented itself was an immense quantity of effused liquid, mixed with feces; and it was soon discovered that a rupture of about an inch and a half in extent had been made in that part of the intestinum ileum which crossed the

cavity of the abdomen anteriorly, about two inches below the umbilicus, and immediately opposite the part which bore the mark of the horse's foot. The whole of the intestines were exceedingly vascular, from the violent inflammation which had taken place; but this was more particularly remarkable in the convolutions of the ileum, which was wounded by the blow. A considerable quantity of coagulable lymph had been effused by the vessels communicating with the wound: a small quantity of pus was also visible; the whole of the omentum was uncommonly red, with great turgescence of its vessels; the bladder was found perfectly sound, empty, and collapsed; the stomach and liver were perfectly free from disease; the gall-bladder was distended with bile.

CASE XVI.

Contusion of the Abdomen and Ruptured Intestine.

Samuel Holt met with an accident nearly similar to that detailed in the former case, and the treatment was conducted upon the same plan; but in spite of every remedy that could be employed, he sunk in twenty-two hours and a half after he received the blow.

On the contents of the abdomen being exposed, a large circular hole was discovered in one of the convolutions of the jejunum. It was situated in contact with the peritoneum, about two inches obliquely below, and to the right of the umbilicus. The fibres of the intestine surrounding the hole had the same appearance as is generally presented by the margin of a recently contused wound; the whole of the small intestines had a bright red colour from the numerous ramifications of their inflamed vessels. That part of the canal extending a few inches above and below the hole was remarkably inflamed: and the vessels had already secreted a purulent-like matter, which adhered to the surface of the intestines in its vicinity. About two quarts of yellowish fluid were extravasated in the pelvis, and among the convolutions of the intestines; the peritoneum was highly inflamed to a considerable extent, in the neighbourhood of the injury. The bladder was empty and collapsed, as were also the large intestines.

In both these cases it is remarkable, that the blood drawn from the arm is not stated to have been covered with buff.

On some occasions, the appearances on dissection do not so

satisfactorily account for the symptoms during life; and in others, we are left in total obscurity. The following case occurred in a civil hospital of great celebrity:

CASE XVII.

Contusion of the Abdomen.

A man, about sixty years of age, was brought into the hospital in consequence of having been run over by a carriage. The wheel had passed over the iliac and hypogastric regions. He felt acute pain on pressure, but no other symptom of inflamed bowels; on the contrary, their functions remained natural and undisturbed. Next day he was bled to twenty-four ounces, which relieved the pain and reduced the pulse; but very shortly afterwards it rose to 140, full, and somewhat hard. Venesection was repeated the next day to twelve ounces. Pain still continued; and on attempting a repetition of the blood-letting, none could be procured from the arm. He died on the fourth day from the accident. On dissection, a quantity of dark-coloured blood was found effused under the peritoneum covering the abdominal muscles in the iliac and hypogastric region, and some of the pelvic region. The cellular membrane about the pubes was particularly injected with it. The peritoneal coat of the intestines was somewhat more vascular than common; but not the slightest symptom of inflammation or organic lesion could any where be traced.

- I may here remark, that death often succeeds to injuries apparently superficial; in which the brain seems to suffer sympathetically merely from their *extent*, a circumstance which favours the ideas of those who consider the whole nervous system in the light of expanded brain. The treatment on such occasions must altogether depend on the nature of the symptoms; but, generally speaking, a guarded use of stimulants, as the Pulv. Ipecac. comp. and volatile alkali, with the tepid bath, will be found conducive to recovery.

CHAPTER VII.

INJURIES OF THE BONES.

I shall now make some observations on injuries of the bones of the extremities, the joints, and their appendages; a train of accidents which, especially if from gunshot, are of the most serious importance, highly dangerous to the patient, and demanding the most cautious management and sedulous attention from the surgeon. In truth, a knowledge of the pathology of bones is indispensable to the army surgeon, and forms the very basis of his art. Severe as injuries may in other respects appear, if the bone be not implicated, their after consequences are comparatively of but little importance. Injuries of the muscular parts, however extensive, are rarely very obstinate in sound constitutions, and under proper management; those of the arterial system, urgently as they call for immediate aid, after that aid has been afforded, proceed in most instances to a favourable termination; but injuries of the bone can never be called unimportant, however early surgical assistance may be obtained, and very seldom, under the most favourable results, do they afford, either to the patient or his attendants, adequate compensation for all the miseries and accidents of a tedious and protracted cure. Still, however, the preservation of a limb, where any rational chance of saving it exists, must be a serious object to the patient, and a desirable result for the surgeon.

I have already observed, that some information may be derived from the appearance of a musket ball after it has been extracted from a wound. Where it has brushed obliquely by a bone, and injured an external plate, its surface is often jagged, and presents the appearance of a file clogged with raspings of ivory. Sometimes it is flattened against the bone without doing such material injury to the periosteum as to occasion exfoliation; but more frequently, long and tedious throwing off of scales follows the injury, and this sometimes is so severe, though fracture may not have taken place, that disorganization of the medullary vessels is the consequence, and abscesses form in the canal. This proceeds from the injuries inflicted by spent round shot and shell principally.* A musket ball often lodges between bones, as those of the fore arm and leg, or the ribs, and by being flattened or indented, and in some respects adapting itself to the ridges of the bones, it be-

* See Ravaton, Obs. 17.

comes a very difficult matter to extract it. In some cases it will take out a portion of the diameter of the bone; and in others, though more rarely, perforate the shaft completely, without entirely fracturing it. More common instances of this perforation occur in the spongy heads of bones, as the humerus and tibia; in all these cases the injury is comparatively simple in the recent state, and our duty is confined to watching the approach of inflammation, and removing any splinters, &c., that may present or come within our reach. In their after stages, however, these perforating wounds of the cylindrical bones become of most serious import, and almost constantly turn out to be cases for secondary amputation.

In some severe cases, where the ball lodges in the bone, particularly about the condyles, by making deep and cautious incisions before great swelling of the soft parts comes on, we may occasionally succeed in removing the metallic mass with a forceps or elevator, either unaltered, or beat out into irregularly angular shapes. Sometimes, however, it is so firmly fixed that it can be removed only by sawing the bone, with the crown of the trephine or other instrument. The accident is always highly serious; but it is possible, under circumstances of peculiar good fortune, in a temperate subject of sound constitution, to save the limb by the operation, as in the following case:—

CASE XVIII.

Ball lodged in the Condyle of the Femur.

Jose de Santos, a quarter master sergeant in the 9th Caçadores, passing along the bridge of Burgos on the 27th of September, 1812, was struck by a musket ball on the outside of the knee, which brought him to the ground. "I found him," says Staff-surgeon Hughes, to whom I owe the history of the case, "at the hospital Del Rey, about three hours and a half afterwards, in great pain, the parts surrounding the joint swelling rapidly, and a Portuguese surgeon endeavouring to persuade him to suffer amputation. The ball was lodged and could not be found, although the wound had been a little dilated to facilitate examination. Measures to subdue inflammation were immediately adopted; on the morning of the 28th he had a violent shivering fit, and another at midnight; copious suppuration was found to have taken place on the 29th, with an abatement of pain, and the ball was easily felt, but immoveable, and seemingly stuck in the bone. Poultices and fomentations were now applied; and on the 1st of October, I found he had had another shivering fit the preceding night, and

that a piece of cloth had come away with the discharge, which was much increased. This evening he was attacked with diarrhoea, and vomited some bilious matter; the suppuration now became profuse, the diarrhoea grew progressively worse, and his rigors continued to return with an exhausting purulent discharge until the 7th, when amputation was again proposed, as the only means of preventing a rapidly fatal termination; but he persevered in his resolution to prefer death to this operation. As the only alternative, I extensively dilated the wound down to the bone, when the ball was found fixed in the centre of the external condyle of the femur, nearly a quarter of an inch below the bony surface. The crown of a trephine was now applied, and a flattened ball was extracted, with several portions of cloth. Light dressing was applied, and next morning it was found he had escaped his shivering fit; his diarrhoea was abated, and he had enjoyed sleep; which, since the first day of his wound, had been nearly a stranger to him. The discharge continued gradually to decrease, and his health to improve; and on the 22d, (when circumstances caused the removal of the wounded,) the parts were healing rapidly, and ankylosis taking place. He bore his journey in a wagon well; and, when discharged from the service three months after, was in good health, and had a tolerably straight knee."

I have never met with a case requiring either the trepan or any other contrivance, except the common forceps, for the removal of balls thus lodged. In eight thousand cases, Baron Percy has not met with one requiring the head of the trepan, and only three in which he used his "tire-fond."*

Where a ball has lain long in the bones, the cancelli break down and admit of its rolling about in the cavity, if it still retains its rotundity. Nothing short of an operation with the head of a trephine or saw, can in this case possibly remove it; the contraction of the orifice by irregular points of ossification confining it completely within the bone.† There are some instances on record where the ball has remained quietly in this situation so long as twenty-five years; but in the majority of cases, a majority so vast as to admit of no shadow of comparison, the violence of the inflammation, the excruciating

* See "Reponses aux Questions Epuratoires" p. 13, annexed to his "Pyrotechnic Chirurgcale, 12mo. Paris, 1810.

† In the brute creation, under certain circumstances, the orifice closes altogether, and little inconvenience seems to be felt; thus, on cutting pieces of ivory, metallic balls are sometimes found bedded within them, without any mark of their entrance. They must obviously have entered the pulp before the secretion of enamel, to cover the adult tooth, had taken place.

pain, the profuse suppuration, diarrhoea, and fever, lead to the removal of the limb as the only chance of recovery.*

A curious instance of a ball lodging in bone is given us by Paré. It is a very rare occurrence, but the case is valuable on many accounts. "The King of Navarre," says he, "was hurt with a bullet in the shoulder a few days before the assault of Rouen, anno 1562. I visited and helped to dress him, with Master Gilbert of Montpellier, his own surgeon, and others; they could not find the bullet; I searched for it very exactly; I perceived by conjecture, that it had entered by the head of the *adjutorium*, and that it had run into the cavity of the said bone. The most part of them said it was entered and lost within the body. Monsieur, the Prince of Roche-upon-Yon, who intimately loved the King of Navarre, called me aside, and asked if the wound was mortal. I told him yea, because all wounds made in great joints, and principally contused ones, were mortal." Paré remained steady to his prognostic, always declaring that the limb would fall into gangrene, which it did, and the king died on the eighteenth day after the wound. A dissection was ordered, and, much to the honour of Paré, the ball was found in the very middle of the cavity of the *os humeri*. He concludes the case by saying, that he returned to Paris, where he dressed several of those who were wounded at the siege. "There were divers," says he, "that recovered, and others died. I believe," he continues, (emphatically addressing Gourmalin, a volunteer critic of that day, whom he invariably calls, "the adversary,") "I believe, my little master, you were called in to dress some of them, for the great number there was of them.†"

In a case of this kind, where the track of the ball is clearly ascertained, no delay can be admitted of, nor can any operation succeed, except that at the joint.‡

But the most serious accidents of all are compound fractures, particularly of the femur; that bone, whose fracture, as observed by Pott, "so often lames the patient, and disgraces the surgeon." Every thing connected with these injuries is worthy of the most particular attention; they are, like fractures from other causes, various as to their situation and their complexity: the bones are either broken transversely or in an oblique direction, or they are fractured in two or more different places; or again, as in the fore arm and leg, one of the bones only is injured, while the other remains entire, and preserves the form

* See Percy, *Manual du Chirurg. d'Armee*, p. 96.

† The *Voyage to Rouen 1562.* lib 29. Johnson's Translation.

‡ Some valuable observations on the Lodgment of Balls in Bone, will be found in Mr. Guthrie's third edition, in the chapter of Simple Gunshot Wounds, p. 91.

of the part. The principle of reduction, coaptation, &c. &c. is the same as in fractures from ordinary causes; but the sources of irritation are infinitely more numerous and more complicated; and the shock occasioned by the injury spreads to a much greater extent, and seems to implicate the whole system.

The estimate of the mortality occasioned by compound fractures of the thigh from gunshot is most melancholy. In the French army, Baron Percy has calculated that scarcely *two in ten* recover. In the English army in the Peninsula, Mr. Guthrie found, that, on a review of his cases, not more than *one-sixth* recovered, so as to have useful limbs; *two-thirds* of the whole died, whether amputation was performed or not; and the limbs of the remaining *sixth* were not only useless, but a constant source of uneasiness to them for the remainder of their lives. In the campaign of Holland in 1814, of eight cases, seven of which were not amputated, one only recovered, in staff-surgeon Cooper's hospital at Oudenbosch;—that patient retained a useless limb. I have not made any accurate calculations myself, but I am strongly inclined to assume Mr. Guthrie's calculation as correct, even including the cases of officers, who are not subjected to the risks encountered in crowded hospitals; in these situations the cases which I have witnessed have, on some occasions, been deplorable. Not a single case has done well where amputation was deferred, and even where it has been performed, two out of three have died. In other instances the losses have not been so severe, but I have never known a larger proportion saved than that assigned by Mr. Guthrie.

The ends in view in remedying these cases are sufficiently obvious; the means are still a subject of discussion. One of the most powerful modes of restoring the use of the limb is its posture; and even in this necessary preliminary the greatest differences of opinion prevail. The bent and the extended position of the limbs has each its advocates. Much as English Surgery owes to Mr. Pott, it is chiefly indebted to him for his excellent remarks on fractures; he first placed in its proper point of view the rational mode of evading or moderating the powerful action of the muscles. The posture recommended by him has for years been adopted as the proper one in British practice; in France, however, a directly opposite mode is pursued, and not without considerable success. It was handed down from the first dawn of rational practice in that country in the days of Paré; and it is a curious coincidence, that the very opposite modes of treatment recommended by those two most eminent men were illustrated in their own persons, each suffering a severe compound fracture of the limb, and each submitting to, and directing the application of, the rules they had

laid down for the treatment of those accidents.* The relaxed position of Pott was carried by himself to the very highest state of improvement; but Paré's was progressively amending from his own time down to that of Desault and Boyer. A due consideration of both the methods will, however, show us, that in neither are all the muscles fully relaxed; and we are in both obliged, to a certain extent, to paralyze them by our pressure, and by our long-continued extension. In cases so tedious in their cure, as gunshot fractures, the question will, in some degree, resolve itself into one of convenience to the patient and his surgeon; and I am warranted, from ample experience, to infer, that lying on the back, with the limb extended, is by far the most tolerable to the patient, and admits of much easier access and dressing; and, what is still more important, is, in its ultimate success, equal, if not superior, to either the bent position of Pott, the patient on his side; or the semiflexion of the knee, the patient on his back, and the limb in a fracture box.†

In mentioning the removal of fractured limbs from the field, I recommended, that, after the bones were placed in as close apposition as the nature of the case could admit, and properly secured, the limb should be laid in a relaxed position; this relaxation preparatory to a move, or pending the violent inflammatory re-action which is certain to come on in a few hours after the receipt of the injury, is by no means intended to be continued through the whole period of the cure; indeed, it has become a question with some able surgeons, whether, if the compound fractures could be set at the moment of infliction, and the proper apparatus for continued extension was at hand, it would not be advisable at once to put them in position. In many situations this is utterly impracticable, from the nature of the service, from the violent spasmodic action of the muscles of the limb, and sometimes, though more rarely, from the obstinacy of the patients themselves.

But, very fortunately, the position in which the limb may be placed on the first infliction of the injury, is by no means of such consequence to the future recovery of the patient, as, from reasoning *a priori*, we might be led to suppose. Chance, which has such frequent and powerful influence over us, perhaps originally suggested what experience has fully proved to be founded in truth; and in no situation can these fortuitous occurrences more frequently present themselves than in military practice. Here the inexperienced surgeon, reduced almost to

* See Paré, lib. xv. chap. 23 and 24, and Pott's Life, prefixed to his Works, by Earle.

† See Bell's Operative Surgery, vol. ii. p. 346, Ed. 2d, Lond. 1814. Cooper's and Travers's Essays, Part ii. p. 49. Sir A. Cooper's Work, 4to. on Dislocation and Fractures of the Joints, p. 146, et seq.

despair at the want of all the comforts and conveniences of the establishments of a rich metropolis, and anticipating his patient's destruction and his own disgrace, will gradually discover that *utility* is often made subservient to *show*, where the means abound; while, with all their privations and inconveniences, and with their exhausted supplies of even the most common materials, the converse of the fact is demonstrated in army hospitals.

The situation of a wounded soldier on a field of battle is pitiable in the extreme: with every means and every wish to relieve, surgical aid cannot be immediately offered to the sufferers, from the nature of the operations carrying on. Hence it is that frequently both victors and vanquished lie for hours undressed in indiscriminate heaps.

After some of the skirmishes in the Pyrenees and near Pampluna, subsequent to the battle of Vittoria, we received into the hospitals of that city several compound fractures, (particularly into the church division of St. Domingo hospital, which was principally filled with these cases, under my charge,) the majority of which had been barely dressed with the common splints and rollers; some had been left undressed for many hours; and none were placed in the regular position for some days after, (in not a few instances for so many as twelve or fourteen,) having for part of that period been *in transitu* to the hospital, and during the whole time the inflammatory symptoms running very high. At Brussels, after the action of Waterloo, the excruciating torture brought on by the slightest attempt at setting the limbs, was, in some instances, very remarkable, but subsided on the use of antiphlogistic remedies and quiet, when they were placed in proper position; and in one case of a German soldier with a fractured femur, the spasmodic contraction of the limb was so great, that the slightest touch produced the most exquisite agony. In this case the muscular action was so violent, that the limb was twelve inches shorter than natural when I saw it, and proportionally thickened; it had been much more so; and I am convinced any violence would have produced an immediately fatal termination. By a soothing plan, a sufficient extension was generally admitted of in some days in all these cases.

In the same action a young officer, Captain G——, was not placed in position before the 23d day. The circumstances of his case, as far as connected with my present purpose, were briefly these:—A musket ball passed into the upper portion of the middle third of the thigh, through the os femoris, and out in a nearly straight line, splintering both ends of the bone extensively. Four days elapsed before he was brought to Brussels and safely deposited in my house, during which period no dress-

ing had been applied; in fact, the clothes in which he had been wounded remained on him to the eighth day, contrary to every persuasive argument that could be used with him. When he did submit to have the limb placed in a proper position, it was effected in so short a space of time, and with so little pain and inconvenience, that he would not believe that I had even commenced the attempt.

These few instances, selected from a vast number, sufficiently show, that immediate extension, coaptation, &c., are not applicable in all cases, neither are they absolutely necessary to the present comfort or future safety of the patient. To which also I may add, that, having been principally employed in the fixed hospitals, during the peninsular war, and the campaigns of the Netherlands, I have consequently had ample opportunities of viewing the state in which the fractures arrived from the field. And although in many the hands of a master were easily recognised in the mode of dressing, in none did I ever see the limb in such a state as to preclude the necessity of going over all the steps of resetting, and consequently of redoubling the patient's anguish.

I shall briefly state what appears to me the most rational mode of treating these very complicated injuries, and which I exclusively adopt, from a conviction of its merits, drawn from a comparison with other plans; premising that I shall suppose the more serious cases (which I have already laid down as calling for amputation on the field) have been operated on, or at least marked for operation, when circumstances, as fever, high inflammation, or excessive collapse, may permit; and repeating, that I am well convinced *the sum of human misery will be most materially lessened by permitting no ambiguous case to be subjected to the trial of preserving the limb*; constitution, convenience for treatment, and local circumstances, having their full weight in the decision.

As compound fractures of the lower extremities, especially the thigh, are the most important, I shall dwell particularly upon their treatment; the same general principles, however, are applicable to those of the upper.

A very short time after a compound fracture is inflicted, a reaction, influenced in its violence and the period of its attack by the severity of the case, the original constitution of the patient, or the accidental circumstances of the wound, always takes place. During this reaction, the process of ossification is completely at a stand; and, indeed, throughout the whole cure, the high inflammatory and suppurative actions are incompatible with the formation of bone. The irritability of the muscles is increased in a very great degree, and violent spasmotic contractions of their fibres take place; the periosteal tube, which,

in simple fracture, supports, as in a case, and sustains the vitality of every part of the bone to which it adheres, is lacerated to a greater or lesser extent, and in part destroyed; the invariable effect of which is, extensive inflammation and thickening of that membrane, followed by the death of those pieces of bone, whether detached or not, which are deprived of it. The first stage, therefore, of compound fracture, is one demanding the most rigid antiphlogistic treatment, the most perfect ease and quiet of the patient, and, except in regulating the fever, requiring but little aid from mere surgery, beyond the removal of detached splinters and extraneous bodies. Much, however, may be done by proper management, particularly of the beds. As the irregularities of an ordinary paillasse would obviously injure our patients, one great source of comfort and ease to them will be, preparing a set of well-stuffed cases of combed straw, wool, chaff, or any other material that may be procured, and placing them on the firmest wooden bedsteads we can get, or on boards and tressels. As it often happens that these cannot be procured, then the paillasses must be placed on the floor, guarded from the damp and cold, if the nature of our hospitals expose them to such causes, by tarpaulins or water deck; and occasional irregularities must be corrected by bolsters, cushions of chaff, hair, wool, &c.

In the inflammatory stage, which lasts in general from five to fifteen days, I am in the habit of leaving the limb in the exact position described by Pott; but with the bandage of detached pieces of roller, commonly called after Scultetus, reaching for six or eight inches above and below the fracture, instead of the eighteen-tailed one, over which it possesses several advantages from its simplicity, and the ease with which it is applied, and its different parts removed, by simply pinning to any of the soiled pieces a fresh slip of roller, and drawing it under the limb into the proper situation, by the same movement, which displaces the rejected parts. Over this I place two splints of whalebone, such as are usually supplied to the army, moderately tight, and in such a way as to admit of dressing the orifice or orifices, if the ball has passed through the limb, without removing them. The irregularities of the limb are stuffed with tow, or rags, or bags of chaff, and the whole is kept moist with cold saturnine solution of moderate strength, and with the addition of some camphorated spirit.* When the inflammatory symptoms are subdued, I then proceed more accurately to adjust the fractured bone; and to this end, place the patient on his back, a change

* Though I recommend the splints, I have seen numerous cases where they have been omitted, and the patient has done perfectly well, the parts being merely covered with compresses moistened with cold water.

of posture which invariably gives relief, filling up all hollows, and arranging the limb precisely after the mode recommended by Professor Boyer,* and applying the bandage of Scultetus afresh, with a roller moderately tight, on the lower portion of the limb, and proper compresses along the parts. I employ the improved splints of Assalini,† if they can possibly be procured; if not, I place two common long splints in the usual way—one from above the hip to the ankle, or from above the knee to the ankle, as the case may be, and the other of proportionate length on the inside,—and, fixing the pelvis of the patient by a bandage to the upper part of the bed, (if overlapping of the bones renders such extension necessary,) I stretch out and retain the limb by means of tape fixed to the bottom, or what I have found answer still better, by a common tourniquet, the centre of its strap firmly fixed round the knee or ankle, and buckled over the bed post, so that, by turning the screw, the extension may be moderately made and increased as circumstances demand. This, which was suggested to me by Professor Thomson, at Brussels, I have found of very great assistance in some obstinate and complicated cases.‡ In this mixed mode we reap the advantages both of the position of Mr. Pott, and that of Paré and the more modern French surgeons. The patient is in general extremely tired of his relaxed position before the lowering of the inflammatory symptoms indicates the time for placing him on his back, a change from which he receives great relief; we may rest assured that the process of ossification has not commenced until that period; and that, consequently, the application of machinery to extend the limb, or splints and bandage to confine and regulate the new callus, is unnecessary, if not hurtful.

The speculative objection that may be offered against the plan of leaving the bones so long unset, is the possibility of an irregular or distorted union, but with daily attention, this can scarcely occur. I have only met with one instance of it; it was in an officer who would admit of no treatment but what he himself deemed proper. In consequence of this, he very nearly paid the forfeit of his life in the first instance, and he is now obliged to wear a high heeled boot, the thigh being considerably shortened and curved.

The great error of all the machines for fractures, from Hildanus downwards, is their complication, and their not admitting of the limb being freely dressed without disturbance, added to which, their price forms a very great barrier to their general introduction.

* Boyer, *Leçons sur les Maladies des Os*; or the Translation by Farrel. *Traité des Maladies Chirurgicales*, tom. iii. page 240.

† Described in his “*Manuale di Chirurgia*, pp. 279, 287.

‡ If the patient lie on the floor, pickets, or some similar means, must be adopted as fixed points.

In compound fractures of the humerus and fore arm, complex machinery is not called for. With ordinary splints and a leather sling, furnished with a strap to go round the neck and support the limb, we are able to manage extremely well. When fever, or some other untoward circumstance, does not forbid it, I always encourage patients with these injuries to keep out of bed as much as possible, the weight of the fore arm assists considerably in keeping fractures of the humerus in a proper state of coaptation, while the flexion at the elbow often prevents sinuses from running down under the integuments and among the muscles of the fore arm, which sometimes occurs when the patient lies long in the horizontal position, and especially if the fore arm is spread out in a line with the humerus, as I have more than once seen.

The after management of compound fractures is a most serious duty, requiring industry, judgment, and humanity, as well as great discrimination in both the medical and surgical treatment. The position we shall suppose to be established by the means already described; its continuance can be ensured by frequent inspection only, which should never be seldom than twice in the twenty-four hours, when all occasional irregularities of posture, or unequal pressure, should be corrected, and all filth (which from the great discharge, accumulates rapidly) should be removed. Once in the day at least, a compound fracture should be *regularly* and formally dressed. On these occasions, all depositions of matter should be carefully pressed out, splinters felt for and removed, and clean slips of bandage applied, in lieu of those soiled or destroyed by the suppuration. To prevent the soaking of the bedding, a piece of coarse cloth or oiled skin should be placed permanently under the whole limb, and occasionally renewed; and, to obviate the ill effects of the matter stagnating in the wound, the lightest scraped lint should be laid on it. In some cases I have effectually obviated this stagnation, when the position of the wound did not favour the flow of the matter, by placing a soft sponge over the limb, which absorbed the pus almost as soon as formed, and by drawing a woollen thread through it, and connecting it with a proper dish below, it has performed the part of a syphon. During the employment of these surgical means, the bowels should be kept in a natural state by saline laxatives when required; and in aiding the patient on those occasions, a very simple addition to our common bed pans would be most useful; viz. making the edges opposite the handles *conical*, as I have seen in the Hanoverian and other foreign hospitals, so as to thrust them gradually under the nates, without forcibly or suddenly displacing the body of the patient. Purgings, however, must be very cautiously employed; the necessary movements are almost certainly inju-

rious to the patient. Anodynes are urgently called for in these cases, and are best combined with antimonials, to obviate their heating and constipating effects. Of the anodynes, the extract of *hyoscyamus*, when properly prepared and fresh, will be found eminently useful. If fever should come on, notwithstanding the most rigorous antiphlogistic diet, perfect quiet, and thorough ventilation, the lancet may be then had recourse to, but with great caution; for the period of debility is soon hurried on by the sufferings of the patient and the profuse discharge; and we must rather trust to leeches and to internal remedies where the slightest ambiguity prevails.

Fresh formation of matter and chains of abscesses often succeed feverish exacerbations, and frequently depend on the presence of splinters. If these sources of irritation can be detected, their removal must be attempted cautiously; and in all cases when the existence of matter is ascertained, it must be evacuated by a direct puncture or counter openings. When all fever has subsided, and the discharge is kept up by debility alone, a light nourishing diet, with a *moderate* allowance of wine, must be permitted; and in such cases, if no local irritation forbid, pressure made uniformly over the whole limb by adhesive straps and rollers, tends much to prevent the formation of sinuses, and to lessen the purulent discharge. Kirkland's defensive plaster, spread moderately thick, is recommended on good authority, both in these cases and in dislocations; it is composed as follows: R. Emplastr. Plumbi. partes ij.; Pulv. Cretæ. Ol. Olivæ, Acid Acetic., *ana* partem j.; Solve leni calore, et Misce ut fiat Emplastr.: it is stated to be a powerful repellant in all cases of violent local inflammation.* In short, the symptoms in compound fractures assume the most Protean shapes, and can only be met by assiduous and unremitting attention, guided by a thorough knowledge of professional principles. Our best endeavours, however, will at times fail in conducting our patients to a speedy or even an eventual cure. I have seen one or two fortunate cases where the compound has been changed into a simple fracture by the healing of the external wound before the osseous union had commenced; but these were not from gunshot, and I believe such a fortunate result never happens after such severe injuries.

In some cases, the disposition to osseous formation is so slow, that, however well the limb is managed, union does not take place for months. In other instances, osseous matter is thrown out from the *sides* of the bones; but the fractured *ends* remain nearly in the same state as when the solution of continuity was

* See Sir A. Cooper on Dislocations and Fractures of the Joints, 3d Ed. p 251.

first effected. In some individuals, no cause can be rationally assigned for this tardy union; in others, it can be traced to constitutional causes, and in some to the existence of extraneous bodies within the wound, either keeping up the irritation or actually interposing between the fractured extremities of the bone, and mechanically preventing their coalition. We are sometimes so lucky as to get at the body thus interposed; but more frequently the rapid sinking of the constitution forces us to amputation. In the case of Captain ——, of the Artillery, who was wounded at Waterloo, the efforts of his surgeon, Dr. O'Beirne, directed as they were by great professional skill, and aided by a most excellent apparatus on Boyer's plan, together with the sound constitution of the patient, and his enjoyment of pure air and every domestic comfort, were baffled for several weeks without any clue which could lead even to a suspicion of the cause, till at length a large fragment of shell, nearly an inch in thickness, was luckily discovered and removed from between the fractured ends of the femur. I have found a piece of leather in a similar situation, and in the course of my examination of several amputated limbs removed from incurable compound fractures, I have discovered, that, notwithstanding every care, both in dressing and position, a piece or pieces of bone, including the whole cylinder, not displaced from their position, (and therefore not to be remedied or suspected,) but with the periosteum injured or destroyed, had formed an invincible barrier to the junction of the living extremities of the bone, between which they had been interposed.

When the dead pieces of bones are small, and only partially detached, the vessels pour forth that matter which is afterwards, by a peculiar process of nature, to become osseous; the fragments are enveloped in the new bony case, and are placed exactly in the same situation as the sequestra in instances of necrosis, from different causes. In general the cure is tedious, the discharge is irregular in quantity, and often singularly offensive in quality; sometimes, however, the pieces of dead bone give very little, if any uneasiness, until cold, external injuries, or excess, give rise to violent and deep-seated inflammation, abscess, and exfoliation.

We have not the same means in our power to excite the ossific action in compound fractures as in those of the simple kind; irritation of various sorts, pressure, friction, external stimulants to the skin, or even the operation of the seton, as practised by Dr. Physick, Mr. Rowlands,* and others, which have been successfully had recourse to in the indolent state of the latter, are

* See Medico-Chirurgical Transactions, vol. ii. p. 47; and vol. v. p. 398; and Mr. Amesbury's Work on the Non-union of Fractures

inadmissible in the former; where, if union is suspended, it is generally from mechanical obstructions, from excessive action, or from disorganization of parts. Original malposition, or subsequent derangement of the bones, are occasional causes of their not uniting. I have lately examined the fore arm of a naval officer, in which the radius was fractured transversely by a musket ball some years since; some of the muscles have got between the fractured ends, which are rounded by absorption; and although, from the ulna still retaining its situation, no distortion of the limb has taken place, a species of ginglymoid articulation, and a partial luxation at the wrist is formed, which greatly detracts from the power of the limb.

While we sometimes meet with cases where no union takes place, notwithstanding a close apposition of the broken extremities of a bone, we meet with others, where, on the contrary, union occurs, although the parts are far from being favourably disposed; sometimes the fractured ends overlap, and the sides of the shaft alone touch each other; sometimes the broken end of one portion of the bone touches the side of the other at a distance from the point fractured, and yet, notwithstanding this very unfavourable position, osseous union is effected, but with a distortion of the limb proportioned to the distance to which the broken ends of the bone are thrown from each other.

The process adopted by nature for the union of simple fractures has been ascertained with considerable accuracy, and is as follows: There is first an effusion of blood around the extremities of the broken bone and into the adjoining soft parts; then a tumefaction of the periosteum and the muscular parts; an exudation of coagulable lymph; an absorption of the effused blood, and deposition of a limpid gelatinous fluid in its place; an extension of the periosteum over this fluid, and a formation of new vessels in it; and finally, a deposition of osseous matter, which appears to take place soonest at the points nearest the old periosteum. Thus far we are enabled to ascertain the steps of the process of re-union, as detailed from the experiments of Dr. Thomson, and Dr. Macdonald, in the inaugural dissertation of the latter,* we also know that osseous matter is deposited in the medullary cavities of the hollow bones in the neighbourhood of the fracture, and that these cavities are obliterated, and so continue for an uncertain period;† but we are more at a loss as to the mode adopted by nature permanently to obliterate the opening of the medullary cavity, at the ends of the bones in overlapping fracture; there is evidently a new effusion of osse-

* *De Necrosi ac Callo.* Edin. 1799.

† M. Beclard states, that in the tibia, or femur, the cavity is re-opened in from 90 to 100 days; I have, however, known it to remain obstructed for some years. See his paper in the "Bulletin de la Faculté," &c. vol. iii. p. 430.

ous matter both on the sides of the bones which overlap, and at their open fractured extremities, and a considerable degree of exertion of the modelling action of the absorbents; but I am not aware of any correct experiments which have hitherto been made upon the subject. In compound fractures we are sometimes enabled to observe the process of reunion of separated bones where there is not much splintering or laceration of soft parts. Granulations are thrown out from both surfaces, a fleshy union appears to take place, and, finally, osseous matter is gradually deposited in this new-formed flesh.

It was supposed among the older surgeons that there was a precise period at which the osseous union of the different bones was effected; thirty days was the period assigned for the union of a clavicle, thirty-five for a humerus, and from forty to fifty for the thigh and leg. It is quite impossible to predict with certainty how soon the union may take place; in young healthy subjects it is always most rapid; in the more simple fractures much less time is required for a union than in the compound; and the upper extremities are found to unite sooner than the lower. These are points to which we can speak with accuracy, and we know also, that in all instances a free pure air is most powerfully conducive to the cure, and that, wherever he may be placed, temperance and cleanliness are of the greatest importance to the patient.

I have had numerous opportunities of examining the effects of disease in cases of compound fractures which have remained long disunited, both after death and after the removal of the limb. In the soft parts I have met with enormous abscesses extending far and wide around the fracture, so that the ends of the bones have been constantly immersed in the contents; and the muscles in many cases, and in some the periosteum, separated for several inches from them. The infiltration of matter has extended far in the interstices and in the fleshy bellies of the muscles themselves, in some cases dissecting these organs very completely one from the other; in others, partially destroying them; and, in numerous instances, leaving no distinction of parts whatever, but a flabby, putrid, offensive mass of decomposed animal matter, the more fluid part of an intolerable fetor, and having thready masses of cellular substance floating in it; while the more solid have had so little cohesion, that they were easily broken down by the handle of the scalpel, bearing in many instances a most striking resemblance to chewed paper, or the pulp of rags.

The blood vessels have been observed very often lacerated, and coagula in various stages, from recent formation to hard consolidated masses, have been found effused from them, separable into different layers, and retaining, even when removed from

the diseased parts and washed repeatedly, a very nauseous putrid smell. The coats of the vessels have been in many instances found thickened and inflamed, and the veins partially filled with purulent matter; but I cannot say that I have ever met with these appearances distinct from the general disease of the soft parts, probably because I have not had many opportunities of examining very recent cases, my experience having been chiefly confined to cases of long standing, and where there has been greater leisure for anatomical researches. Indeed few army surgeons could spare time immediately after an action to make long and accurate dissections. The bones have not, in some instances which I have examined, participated so much in disease as the soft parts; nor have the joints in the vicinity of the fracture appeared to suffer nearly so much as might have been imagined. This exemption has only occurred in two cases; and in both, of officers of high rank and sound constitutions, who most punctually fulfilled all the directions given to them by me, and were exemplary in their strictness of regimen. One, the Honourable Colonel S——, was an elbow case; the fracture one inch above the condyle of the os humeri: soft parts nearly gangrenous: joint filled with puriform matter, without any traces of inflammation of its synovial membrane: bones in close apposition, their ends covered with a very florid spongy flesh, but no appearance of ossification. These appearances were observed three weeks from the receipt of the wound. The other was an ankle-joint case, Lieutenant Colonel B——. Two inches from the joint: soft parts beginning to run into gangrene: bones in pretty close apposition; the ends covered with a florid spongy flesh, very easily separable, but without any trace of ossification: joint with some puriform matter, but no traces of inflammation. Dissection six weeks from the receipt of the wound.

In the remainder of about fifty cases that I have examined myself or been present at the examination of; and thirty examined by gentlemen in whom I place the highest confidence, more or less of disease was observable in the bones, exclusive of the solution of continuity effected in them. The appearances, which were sometimes separate, but much oftener combined, were generally as follows: Roughness of the extremities of the fracture; denudation of the sides of the bones, and worm-eaten absorption of them; inflammation and ulceration; exfoliation of various sizes, and of different stages of looseness, on the extremities of the fractured ends, but not often including the *whole circle*; the same on the sides of the bones in the vicinity of the fracture; the same at a distance from the fracture, but not continuous with it; a line of separation between the bone and its epiphyses or processes very evidently marked, and of a vascular

appearance; (this last appearance I have seen only at the ends of the bone farthest from the source of circulation; and in such cases, abscesses were formed over the diseased points;) loss of the cancelli in the medullary cavities of the bones, with destruction of the medulla itself, or conversion of it into an offensive bloody ichor, filling almost the entire canal; loss of the cancelli, with a bloody fungus, filling the medullary canal like a stopper or tompion; loose adhesion of the muscles to the bones, to such an extent as that separation could be effected by the handle of the scalpel or by the finger; the whole neighbourhood of the fractured bone of a greasy unhealthy appearance; and, finally, necrosis, or complete death of the bone, with deposition of new osseous matter; the deposition being irregular, and evidently unhealthy, distorting the limb to a great degree.

Such have been the local appearances on dissection. All this organic injury cannot be supposed to exist without great general disease; the fever, the cough, the diarrhœa, are all harassing and alarming to the greatest degree; they sometimes invade separately, and sometimes in combination, and produce not only all the appearances of pulmonary consumption, but too frequently its fatal termination. If tubercles, or a tubercular disposition exists in the lungs, no medical aid will relieve the sufferer, and, indeed, while the great source of irritation remains, even the temporary alleviation of his misfortunes is looked for in vain. The first approaches of these insidious bowel and pulmonary affections, are much better combated by management and diet than by any medical means. This I am authorized to assume as certain, from having traced them in a vast variety of instances to errors in these important points; having checked them when forming, by proper restrictions, and having prevented them altogether, in cases where they have been naturally looked for from the examples of preceding victims; and these errors have been so very rarely on the side of abstinence, that the exceptions merely tend to confirm the general rule of "strict limitation." Restriction in the use of wine is one of the most difficult to effect in military hospitals; but it is one that calls most loudly for attention. The idea is *absolutely erroneous*, that a large quantity of this cordial is necessary in the advanced stages of fractures and wounds.

The disposition to Necrosis in gunshot injuries of the bones, a circumstance of daily occurrence in military hospitals, is always tedious, highly troublesome, and frequently dangerous. The precise time of its commencement is not easily ascertained: I have detected it on the twenty-first day from an injury; but it is more frequently a disease of the advanced periods. It is most frequent in bones covered by their soft parts, while caries

takes place more readily when they are exposed to the air. Where the periosteum is removed for any extent by a gunshot or lacerated wound, or suffers disorganization afterwards from any cause, whether inflammation, ulceration, or erosion; or where the medulla is injured or destroyed, it becomes a never-failing occasion of the death of that part of the bone in the immediate vicinity of the injury.

This is not the proper place to enter upon an inquiry into the power or influence of the periosteum in the formation of bone, as a question of pure theory or physiological research. The fact that bone is never regenerated where the periosteum is extensively injured, is beyond all doubt.

There are few military surgeons accustomed to the examination of limbs removed by amputation from causes affecting the bones, who have not found the diseased or fractured part suffering a loss of its healthy colour, and acquiring a sponginess, or a honey-comb appearance on its surface; but to speak more accurately, exhibiting proofs of the action of the absorbents. If an attentive examination be made of the soft parts surrounding the injured bone, osseous granulations will be frequently observed in various degrees of progress to perfection. In some places they lie in small irregular masses, hanging by very slender membranous filaments, and easily separable by the finger or probe, or even by simple agitation in water. In others, they form a continuous surface of various extent, and seem like an incomplete sheath or irregular envelope thrown over, or around the injured bone, studded as it were on its inside face with hard bony particles; and often, if the living bone is examined, a corresponding granulated tissue or efflorescence will be observable on it, as if proceeding to meet the former. All these phenomena clearly appear to depend upon the action of the periosteum, whether adhering to the living extremity of the fractured bone, or separated entirely from it; but still possessing vascularity and life by its connexion with the soft parts. The following case, selected from many others, affords a very striking example of this kind:—

CASE XIX.

Secondary Injury of the Femoral Vessels, and of the Os Femoris.

A soldier of the fourth regiment of infantry received a wound at the storming of Badajoz from a musket slug, which brushed over the course of the femoral artery, nearly where it

dips under the sartorius, and passed through posteriorly at the centre of the limb. Both orifices of the wound healed in a very short time; soon after which a hardness and fulness of the part manifested itself, attended with slight pain, supposed to proceed from some pieces of cloth, or other irritating cause, though afterwards, from concomitant circumstances, conjectured to be aneurismal. Shortly after, the man was attacked with the fever of the season, by which he was very much reduced in strength; and, having been a Walcheren subject, little hopes of his recovery were entertained, as a tumour of the spleen had evidently formed. The progress of the tumour of the thigh had been rapid during this febrile attack; and his general health was much impaired. It appeared that the tumour was attended with the most excruciating pain on pressure, and particularly at night, even from the weight of the bed clothes; it spread upwards to within a hand's breadth of the groin; and downwards to the harn. The lower limb was œdematosus and almost insensible. It was now obvious that something must be immediately done; and, as little chance appeared by performing any palliative operation, it was determined to remove the limb. The operation was performed on the twenty-first day, by Assistant-Surgeon Scott, then of the 11th regiment, afterwards a resident practitioner in Dublin, without any thing remarkable occurring except the number of small blood vessels to be tied. The limb was carefully dissected by Assistant-Surgeon Edwards of the 43d regiment; the soft parts were flabby, œdematosus, and in some spots disorganized, and the great vessels either shrunk or obliterated; but no actual rupture of them could be traced. A large cavity, capable of containing about two pints of fluid; was found deep in the centre of the thigh, involving the course of the slug, and filled with a mixture of grumous blood and fetid purulant matter. The bone, for the space of about four inches, was found denuded of its periosteum, and rough to the touch. On sponging out the parts, the centre of the cavity appeared occupied by the bone, and its sides were partially composed of a sheath of bony granulations, in some spots nearly of a quarter of an inch thick, firmly adhering to the periosteum, (which itself adhered to the mass of muscles,) and evidently proceeding from it. The detachment of the membrane from the bone appeared to have been produced by a deep-seated collection of blood, most probably proceeding from sloughing of the coats of the femoral vessels, and slowly exuding into the track of the wound which formed the original cavity. It is likewise probable that the slug, in its passage, had brushed the bone and killed its enveloping membrane; and that when the space between the bone and injured membrane (which always separates) became distended with fluid, the sound part of the

periosteum was forced up by the pressure on it. Be this, however, as it may, nature had made considerable progress towards the formation of a new bone, in the short period of three weeks, solely, as it appeared, by the agency of that membrane. This bony exudation from the periosteum is still oftener apparent where amputation is obliged to be performed a second time, from causes which I shall hereafter mention; or where, the operation being already performed, the patient falls a victim to the irritation of a diseased bone.

Professor Weidmann has collected a number of authorities on this subject, and particularly relates an instance where Justamond had removed a necrosed bone by gouge and mallet; but having totally destroyed the periosteum, no bone was ever regenerated afterwards.*

The practical inferences to be drawn from this power of the periosteum are particularly valuable, as guides to the boundaries we should ascribe to the extraction of splinters from compound fractures. If the splinter is large and adherent at many points, and particularly if it is longitudinal, it will be worse than useless to attempt its removal by force. I have seen several instances in which fever, intense pain, and even death, have followed such a wanton interference with the operations of nature. If the periosteum is not irrecoverably damaged, partial or even entirely new formation may take place, and the separate portion of bone will reunite; if it is, nature will herself point out the necessity for removal, by the gradual loosening of the parts, which at length becomes perceptible to the finger or probe.

The two following cases, furnished me by my friend Dr. Knox, bear strongly on this point; and the latter serves to illustrate some of the observations made on the extraction of balls.

CASE XX.

Longitudinal Fracture of the Tibia.

A French prisoner of war had been wounded by a musket ball in the left leg. It fractured the tibia about two and a half or three inches above the ankle-joint. The fracture extended longitudinally, and as several loose pieces of bone were ascertained to exist, it was proposed to extract them by an incision,

* The Professor's excellent Latin Treatise *De Necrosi Ossium*, Francofurti, ad Mænum, 1793, folio, is exceedingly scarce; but a good translation has been published at Paris in 1808, by M. Jourda, one vol. 8vo.

as they seemed the only obstacle to the completion of the cure and final recovery of the limb. An extensive incision was made; but nearly all the loose pieces adhered by one or more points, and could not be brought away by any reasonable force. The wound was therefore allowed to heal up, and nature to resume her own operations, till towards the latter end of the third month from the infliction of the wound, the largest splinter and the only one then remaining loose, actually protruded of itself, and was easily extracted by the common dressing forceps. The wound almost immediately healed, and the patient was sent to his own country.

CASE XXI.

Compound Fracture of the Thigh.

A French prisoner was brought into Brussels soon after the battle of Waterloo, severely wounded in an action with the Prussians; he received after he fell several bayonet and sabre thrusts, and one lance wound through the chest; but the most serious injury was a compound fracture of the right thigh from gunshot. Three musket balls had struck nearly at the same time on the outer side of the limb, splintering the *os femoris* from the middle of the upper third of the bone to within two inches of the condyles. The discharge, as might be expected, was enormous; but his appetite fortunately remaining good, he was enabled to support a waste of fluids scarcely to be credited. Whilst under cure, many extensive incisions were made to extract bones and balls; but with most extraordinary want of success. After the failure of these incisions, one of the balls spontaneously presented at the orifice, and another came away in a cataplasm. Although a recurrence to more ample incisions was pronounced the only chance for the poor fellow's recovery, no farther operation was attempted; but by minute attention to dressings; supporting his strength, and, above all, moving him to another hospital which enjoyed a purer air, the fracture consolidated, a very few minute splinters were easily removed by the dressing forceps, and the man recovered.

In some instances, though more rarely, no apparent exfoliation whatever takes place, notwithstanding that the bone is considerably shattered and exposed to the air, a cause which so frequently occasions its death and separation. Nothing but the youth and sound constitution of the patient, which admits of the recovery of the injured membrane, and the cleaning of the ulceration of the bone, can account for this. The more minute

scales or comminuted portions are carried off by the flow of purulent matter, either totally unobserved, or in small palpable particles.

Deep incisions, will, indeed, often produce exfoliations, but they are then the consequence of the unnecessary injuries inflicted by the surgeon, and not the result of nature's efforts at regeneration. I might produce a great mass of evidence illustrative of the propriety of patiently waiting the event, and not hurrying into operations under the false idea that exfoliation must necessarily follow every injury inflicted on a bone. I have often seen extensive and most painful incisions made down to the bone, and in the whole course of a limb that has been fractured, for the ostensible purpose of admitting of the free removal of fragments, and I am convinced I have often traced the eventual loss of the limb to such causes. I would not by any means be supposed to insinuate, that incisions are not called for and highly proper in many instances, particularly where a free discharge is not afforded for purulent matter, or loose spicula lying within a confined cavity; but I would wish to impress on the younger surgeon the propriety of sparing his incisions until he has some *determinate object in view*; and while in quest of dead bone or deep-seated abscess, not to lay the foundation for both, by his own ill-judged attempts at detecting them.

The natural efforts at exfoliation commence at different periods, and its progress is rapid in proportion to the smaller or greater solidity of the bone, or the state of the periosteum; the separation of the scale or piece being always more rapid in proportion as it is more or less deprived of that vitally important membrane.

A method for the excitement of exfoliation in carious cases, or the removal of the sequestra of bones in a state of necrosis, has been long a desideratum among surgeons, and has produced several contradictory and some ludicrous remedies. Raspings, burning, boring, and cutting, have all had their advocates, and oiling, drying, and immersing the bone in strong pickle, or even in aquafortis, have been considered useful by others. Some place their faith in the external application of euphorbium and burning oils; others rely on internal medicine; and one author places all his hopes in the exhibition of assafœtida in this manner, having no confidence in topical remedies.*

I have long laid aside all topical applications to bones about to exfoliate, the common simple dressings excepted; and with a

* Block, see Weidmann, p. 40, and the authorities quoted by him, or the Translation by Jourda, p. 115, et seq. See also Monro in Medical Essays of Edinburgh, vol. v. article 24.

due attention to cleanliness of the parts, and to the state of the stomach, bowels, and skin; with gentle excitement by a probe or forceps, and a prudent and regulated use of the knife or prepared sponge, although the cure may be tedious, I have generally found it complete.

In cases where the separated pieces lie loose, and cannot easily be got at by the forceps, setons have been employed with some advantage, for the purpose of bringing them away; and when judiciously applied, and not carried to such a length as to affect sound pieces of bone with caries, and thus produce what they were meant to remove, they may often be usefully had recourse to. Staff-surgeon Boggie showed me some cases at Brussels in which he had employed the seton with success, and an account of a case in which he adopted the plan, is published in the 7th volume of the Medico-Chirurgical Transactions. Doctor Arthur, surgeon to the forces, has also successfully used them in old cases at the general hospital of Chatham. But to the indiscriminate introduction of setons in gunshot injuries, either of the bones or soft parts, I cannot help entertaining strong objections. They are at best but a clumsy and unmanageable substitute for the knife, and in numerous instances much more painful and irritating.

In limbs with a diseased bone, the state of the soft parts depends, in a great measure, on that of the bone. The exfoliations, or the protrusions of sequestra, are generally announced by an alteration in the appearances of the part, as well as in the quality of the discharge, and to attempt any permanent improvement in either, is perfectly hopeless, until the state of the living bone is meliorated; but much temporary advantage may be derived from external applications and the proper use of pressure and bandages, with the occasional employment of the knife. Cloths immersed in vinegar and cold water, or in moderately strong saturnine lotions, may be placed around the limb if much inflammation is present; and solutions of the sulphate of copper applied to the sores will be found very useful to correct the fetor of the discharge, and stimulate the vessels to a more healthy action. Aluminous solutions are also of considerable utility in correcting the fetor, and a diluted nitric acid will often be advantageously employed in very sluggish cases with a luxuriant fungus, or a sloughy disposition. Very little, however, is to be expected from any of these remedies, if the general health is not supported, and the most rigid cleanliness and ventilation observed in the wards where such cases are treated.

Where the patient can move about, exfoliations are often remarkably promoted by moderate exercise of the affected limb. While using the very simple machinery of Hilsea hospital,

hereafter to be described, I was much struck by this circumstance. A great deal is no doubt to be attributed to the improved health, which admits of, and is connected with exercise, and respiring a pure air out of the wards of a hospital; but I conceive much is also to be referred to the mechanical action of the muscular fibres upon those points of bone into which they are inserted, and which, if loosened from the main mass by disease, must certainly be considerably influenced by a steady and protracted natural force acting upon them, without the aid of surgical instruments, or the violence of operations.

Where, however, a perfect necrosis has taken place, and the dead bone is invested with a living covering, respectable as the authority of Weidmann is, for leaving almost all to nature, I must, from my own experience in military practice, strongly recommend having recourse to the more active measures usual among British surgeons to save a life at least, if we cannot save an efficient soldier to the country. In determining the proper period, it is always to be kept in view, that the new envelope is much more dense when fairly formed than the original bone; it is entirely destitute of cancelli, and the earlier the opening of it is made, the easier will it be to the operator, and the patient will be saved much misery and irritation. It should also be recollect, that in fractured bones, when union has taken place, the medullary canal is obliterated at that part, and filled up by the new callus, which is not absorbed for a length of time. Hence, partially perforating the shaft of the bone in search of sequestra is often useless. The septum formed across the cavity will render a perforation necessary, above and below the union, should sequestra exist in both the upper and lower division.

I shall now advert to a species of the comminuted compound gunshot fracture, which, although at first of but little consequence in appearance, is of most serious importance in its results. This occurs where a musket ball has perforated a cylindrical bone, without totally destroying its continuity, and, consequently, without producing any distortion of the limb, or other symptoms which characterize a fracture. The foundation of infinite mischief is, however, laid; for not only is the shaft of the bone injured, but fragments are carried into, and lodged in the medullary canal; and if the limb has been in an oblique position, or the ball has taken an oblique course, these fragments are often driven in to a great distance, and firmly impacted in its cavity, there keeping up a constant and uncontrollable irritation, and destroying both the medulla and its membrane, together with the cancelli, which naturally support it. I have repeatedly seen this separated portion of bone lying in the medullary canal, at the distance of from four lines to an inch and a

half from the circular hole formed by the passage of the ball, retaining its shape, its colour, and its solidity, while all the surrounding osseous parts were diseased, and formed a spongy, discoloured mass of bony granulations around it; the periosteum for some way, both above and below the wound, being entirely separated from the bone. To attempt to save such a limb is imposing a task on the powers of nature, which nineteen times in twenty she is unable to effect, even under the most favourable circumstances. If a ball has passed through without carrying in any fragments of bone, a case which sometimes happens in the thigh, when the man is standing erect, and the ball has struck the bone fairly and directly, the case is more favourable than when the wound is oblique, as in the arm, which is so often thrown into a variety of postures; and, consequently, where there is a greater chance that the channel of the ball should be formed obliquely, and the spicular fragments forced up into the medullary cavity. But even of this favourable variety I have seen only two cases cured, both of persons struck on the centre of the femur, the wound admitting a finger to be passed into the bony ring, or perforation, and there to find a clear, unembarrassed, and comparatively simple loss of parts. By far the most frequent result is the loss of the limb sooner or later, after a very tedious and distressing train of symptoms, exhausting to the patient, and baffling every endeavour of his attendants. On examination, we find bony fragments lying beyond the reach of operation, either in a parallel direction in the cavity of the bone, or fairly wedged across it, the medulla destroyed, the cancelli absorbed, and, if the posture of the limb admits of it, the fragments falling down deeper into the canal, as the bony net-work is removed. To obviate these mechanical injuries, nature makes many inefficient efforts, and throws out large shapeless bony masses, which either envelope the diseased parts completely, or else so embarrass and partially fill up the orifices of the wound in the bone, as to render the extraction of fragments, or even their detection, next to impossible. The attempts of nature to remedy this state are often continued so far as to form orifices, or *Cloacæ*, in this newly formed bone, for the discharge of the fragments. In some cases, the parts of the bone which originally formed the sides of the ring, and kept the limb in its natural position, and at its due extent, are entirely absorbed; little or nothing but the new and loose osseous sponge remains, and the muscular power being constantly exerted on it, a shortening and thickening of the limb succeeds.

I shall, in farther explanation of this important point, offer a very interesting case, with which I have been favoured by my friend Dr. Denmark, physician to the fleet, and late of Haslar hospital.

CASE XXII.

Complicated Fracture of the Thigh.

“James Wood, a marine, belonging to his majesty’s ship Ajax, ætatis 25, was admitted into Haslar hospital, 27th September, 1811, for a gunshot wound through the right thigh, the ball passing from before backwards, about five inches above the patella. I saw him nearly a year previous to this, (on the day succeeding to the injury,) and recommended the able surgeon under whose care he was, on board the Ajax, to attempt the preservation of the limb. Neither the joint, nor any important blood vessel being implicated, justified, in my opinion, the trial, although it was sufficiently apparent that the ball had passed directly through the diameter of the bone.

“On my appointment to Haslar hospital, in May, 1812, I there found him a patient, deriving all the advantages which hospital treatment and professional talents could afford, during this long period, without being one whit nearer recovery. The lower half of the thigh was now much enlarged, visibly shortened, the muscles having nearly lost all power over the flexion and extension of the knee-joint, and the constitutional health materially injured.

“The occasionally favourable but deceptive appearances of the wound, together with the patient’s youth, constitution, and entreaties to defer the operations, were the chief causes of procrastination. The discharge would, at times, become greatly diminished; the healing process would, for a while, seem to go on rapidly, with the absence of pain, and subsidence of inflammation, when, all at once, these last would again recur, with the formation of deep-seated abscesses, bursting out of matter, and high symptomatic fever. Such harassing alternations induced him at length to coincide in the impropriety of farther delay towards the removal of the limb. It was, accordingly, performed on the 7th of September, 1812, nearly two years subsequent to the infliction of the injury.”

The soft parts down to the bone, integuments, cellular substance, muscles, and periosteum, were all much thickened, from the interposition of consolidated lymph, consequent upon long preceding inflammation. The periosteum was extensively diseased, thickened and highly vascular round the wounds to a considerable distance; and a large mass of osseous matter was thrown out. A detached portion of bone lay in a transverse position between the upper and lower extremities of the fracture. The apertures in the bony mass were nearly blocked

up with an adhering gelatinous substance, separable only by maceration, which no doubt, (by its closing from time to time round the detached bone, so as to confine the discharge,) contributed to the above phenomena of favourable appearances, succeeded by pain, inflammation, burstings of matter, &c. This man was soon discharged cured, having recovered quickly from the operation.

In some severe gunshot fractures, especially of the thigh, the bone is divided into different fragments; and that part of the shaft which is not comminuted, is *fissured* to a greater or lesser extent, proportionate to the violence of the blow. This is a case very serious at best, but desperate, if, as occasionally happens, a piece of bone be driven into the medullary cavity, where its first effect is to kill the medullary membrane; and secondly it acts exactly like a wedge, and keeps the sides of the fissured bone so effectually asunder, that they do not admit of being placed in juxtaposition. Yet even here, nature endeavours to bring about a union of the disjoined parts, by an effusion of new osseous matter.* The femur had originally been fissured in four places, and the separated pieces were kept asunder by the interposition of a *transverse* wedge of bone, in the same manner as a port-crayon or tire-ball, when the pencil or ball is between its blades. At one point an osseous bridge is thrown across between two of the separated portions which are seen in the present view. The posterior portion, which cannot be seen in the engraving, is connected to the other parts by a mass of irregular osseous matter, in which several insulated fragments, are imbedded. The history of this individual case I am unacquainted with; the subject must have retained the limb for some time after the injury; but whether amputation was subsequently performed I cannot say; I owe the preparation to Professor Thomson.

It very often happens, after gunshot injuries of the bones, that the limb feels and looks more like a plaster cast, than a living organized part; from the quantity of irregular osseous matter thrown out. This matter sometimes involves the neighbouring joints, and occasions incurable ankylosis, which is a still more certain consequence if the surfaces of both bones are injured, in which case each contributes its proportion of osseous granulations, in which the sound portions of bone become imbedded. The removal of the limb is in these cases frequently our only remedy. In some cases this matter is thrown out in profusion, and yet the fractured parts remain disunited.

In some cases, this osseous deposit is not confined to the im-

* In plate, 1, fig, 3, of the second edition of this work, there is a specimen which illustrates this point.

mediate vicinity of the injured bones. I have in my possession some specimens, where an irregular osseous fungus has sprouted out, as it were, from the sound shaft of the bone, one or two inches from the mass of disease, and completely detached. This operation of nature has taken place in some instances at several distant points at the same time, and all the fungi have become successively involved in the advancing and increasing deposite.

In some cases, these osseous exudations appear on the ridges of bones, sticking out from them in the form of spicula, and giving the bone a serrated appearance: in others, the surface of the bone is covered with new-formed osseous matter, divided into numerous sulci parallel to each other, and with processes of the periosteum dipping in between them, in a manner very nearly resembling the surface of the stones of some fruits; but in the ordinary process of the formation of a new bony sheath from necrosis, the surface is more uniform, with irregular minute holes into which these processes sink. In the recent bone, these irregularities are all concealed by the investing thickened periosteum, which, by its affording a uniformity of covering, often gives rise to a deception, in some cases so complete, as to lead to the supposition that the heads of the bones participated in the renovation of their shafts. This is never the case; the process of renovation in necrosis goes on only in those parts of bones corresponding with their medullary cavities, and the apparent renovation is shown to be illusive on the removal of the periosteum by careful maceration. If the removal is attempted by the unassisted knife, the effect is very incomplete, the membrane is glistening in appearance, and in consistence somewhat like cartilage, and only loosens by long maceration, when it peels off in a tough leathery coat, connected to the subjacent bone by vascular threads; and on its removal, a smooth narrow ivory-like line is found to connect the new formation to the original epiphysis, while the old bony shaft is in various stages of decay. If the necrosed part be examined, while nature is in full work, that part of the new bone most recently deposited, can always be very readily known by a beautiful distinctive mark; the external periosteal covering is thickened, red to the eye, and when peeled off, the subjacent parts, before they are clean washed, give exactly the appearance of a piece of parboiled pork, from which the rind has been torn; the surface of the bony crust is covered with dots where last deposited, while, when of older date, it is covered with sulci, formed apparently from several dots being united in parallel lines, by the absorption of the solid interstitial spaces, which at first existed between them.

Two processes of nature are frequently going on at the same time in bones; viz. the effusion of the substance which I have

denominated, from its irregular shape, osseous fungus; and the separation of pieces of decayed bone by the process of disjunctive absorption. The appellation of Spina Ventosa, is sometimes applied to this appearance; but, I conceive, very erroneously, as that name is applicable only to internal abscesses of the bone, accompanied with caries.

A proper selection of cases for amputation, and an early performance of that operation, will prevent the occurrence of many tedious secondary affections of the bones; but notwithstanding all our care, dangers of this kind will arise in cases where, in their original state, no such consequences were to be apprehended, the injuries having been simply contusions without fracture. Constitutional or local irritation, and errors of diet, are the principal causes of these untoward occurrences; they are always preceded by rigors, febrile heat, loss of appetite, deranged state of the bowels, restlessness, deep-seated pain in the bone, erubescence, and tumour extremely sensible to the touch, all indicating periostitis, and affection of the medullary membrane; which, if going on to inflammation of the bone itself, or to suppuration within its cavity, or to inflammation and abscess of the neighbouring joints, is often fatal. The obvious course to be pursued in the commencement of such cases, is the antiphlogistic plan, rigorously enforced;—nauseating doses of antimonials, purgatives, and, above all, local blood-letting, by leeches, or the scarificator; while, after having been blistered, the affected parts should be covered with compresses dipped in cold applications, of which cold water, with a small proportion of vinegar, is perhaps the best. If by these means relief is not afforded, an incision down to the bone, freely dividing the tense and inelastic periosteum, will be the most likely means of succeeding. I have often tried it, or seen it tried successfully; but I must confess that I have also often seen it followed by no favourable results, and that true Spina Ventosa, or suppuration within the bone, and necrosis, have supervened.

During the period that a patient labouring under a compound fracture, or an injury of the joint, is necessarily confined to bed, great attention should be paid to the prevention of those troublesome affections of the skin and muscles, known under the name of "bed sores;" even in civil life, these affections are extremely apt to occur; but in military hospitals, where the materials of the beds are often extremely coarse and ill arranged, they are much more frequent. Where the patient is laid on his back, and the extended posture of the limb is adopted, it is almost impossible to prevent excoriations of the heel, the calf of the leg, and the buttocks; but by proper management they may be greatly alleviated. Old linen properly folded, or tow, or pads stuffed with bran or any soft material, should always be placed so as to

relieve the parts most subjected to pressure; these parts may also be defended by adhesive plaster, or the soap plaster spread on leather; but the most useful articles of all are circular pads of various sizes, hollow in the centre, so as to resemble the rim of a bed-pan, and well stuffed; these are so placed under the buttock or heel as to support them effectually from the pressure of the bed. Nothing is more annoying to a bed-ridden patient, or sooner gives rise to excoriations, than the crumbs of bread which so frequently accumulate around him, and which are soon hardened by the heat of his body. The patient cannot take his food out of bed, and the surgeon will find it well worth while to pay some attention to this apparently trifling object, which can be so easily obviated.

In hot weather great difficulty is often experienced in keeping sores of all descriptions, but especially compound fractures, free of maggots. Much may be done in the way of prevention, by proper attention to cleanliness, and particularly by the removal of fragments of food, which soldiers are always in the habit of concealing about their beds, if not strictly watched; some surgeons wash the sores with decoctions of bitter herbs, for the purpose of removing these troublesome guests. I have not seen great advantage derived from this practice, and I prefer, upon the whole, the lotion of vinegar and cold water.

Proper cradles for defending fractures from the pressure of the bed clothes are one of the first of the minor comforts; those which have been hitherto supplied to military hospitals are of wood, very clumsy in general, very fragile, and occupy a great deal of room; it would be a considerable improvement if these articles were made of wire. Any person of common ingenuity can strike out some substitute, by bits of hoop, or twigs, whenever a deficiency of them occurs.

I have already mentioned an improved bed-pan for the use of patients with fractured limbs; no person who has not been accustomed to these cases can be aware how greatly his patient is relieved by attention to points of this description: the natural awkwardness of a wounded man, his pain and fretfulness, and the ignorance or moroseness of servants, tend greatly to aggravate his sufferings; but, independent of motives of humanity, cleanliness is greatly promoted by attention to the supply of proper utensils for receiving the evacuations of the sick. From economical motives, pewter has received the preference in the manufacture of those articles, but coarse earthenware, properly glazed, is less offensive to the smell, under any casual accumulation of filth; and they are also much more easily cleaned, an object of no small importance, by enabling us to apply the labours of the servants to other urgent purposes.

CHAPTER VIII.

OF INJURIES OF THE JOINTS.

THIS is a most important class of injuries, and forms, as I have already stated, one of the leading causes for amputation on the field of battle; but serious as the consequences in general are, when a large joint has been injured by the passage of a musket ball near or through it, there are highly favourable cases, in which the limb may be saved. Where shells or grape brush or graze along the joint, and even partially open it, as sometimes happens, there is also a *possibility* of saving the limb; but in all those cases, however anxious we may be to do so, we should never allow our hopes or our wishes to deceive us; we know not the moment that inflammation may set in and mar our most sanguine prospects; and it is but justice to ourselves and our patients, to explain to them or their friends the probable failure of all our endeavours. The cavities of the joints, especially of the shoulder, are often opened by sabre wounds; and if they are immediately closed, and proper attention is paid to the after treatment, a cure is frequently effected. Among the native Indian troops, especially where the tendency to inflammation is not nearly so violent in general as among Europeans, I understand that wounds of this kind are not considered as particularly troublesome or unpromising.

In all cases where we may be induced to attempt the preservation of a joint, the extent of the wound, its vicinity to the large vessels or nerves, the comparative injury done to the bones forming the articulation, the constitution, habits, and mode of life of the patient, the possibility of enjoying rest and quiet, the nature of the accommodation to be procured for him, the purity of the air, the crowded state of the hospitals, and the facilities afforded to his medical attendants of seeing him and enforcing their orders, must all be maturely weighed. Scrofula and habitual drunkenness are almost insuperable bars to effecting a cure under any circumstances.

In my own practice, I have met with only two cases where the limb was saved after a serious injury of the knee joint,*

* The head of the fibula is in some favourable cases the part alone injured; and it has in some of these instances been removed without any farther operation, and, of course, without implicating the joint *directly*; even this, however, is by no means a frequent occurrence.

and in one of them only was the perfect use of it restored. I never met with an instance where the ankle or elbow-joint was perfectly restored after severe gunshot injury, though somewhere the limb has been saved. Of the shoulder-joint the recoveries are more frequent than in either of the other cases, probably in consequence of its less complicated structure.

Mr. Hunter* gives us the case of a man, C. D., who was shot through the joint of the knee. The ball entered at the outer edge of the patella, crossed through the joint under that bone, and came out through the inner condyle of the os femoris. This man, and four others, had nothing done to their wounds for four days after receiving them, having secreted themselves in a farm house, and, when brought to the hospital, the wounds were only dressed superficially, and they all got well. Had this man been placed in a wagon or on horseback, and carried for some miles to a hospital, with his usual allowance of food, would the result have been the same? I confidently answer, no. Nothing but quiet and abstinence could have produced such an exemption from inflammation; and, even with these circumstances in his favour, the case is one of a thousand.

The more general results of injuries of the knee-joint (which are the most frequent of all) are pointed out in the following cases, furnished me by Staff-surgeon Simpson, late of the 36th regiment.

CASE XXIII.

Of Wound of the Knee-Joint terminating fatally.

A soldier, at the action of the Nivelle, received a musket shot in the knee-joint. The joint was thoroughly perforated near its centre; the temporary dressings usually employed on such occasions were applied. When the heights were crowned by our soldiers, and the enemy dislodged from their last position, our wounded were conveyed into the huts previously occupied by the French troops. On a more minute examination of the different casualties of the day, no case appeared to demand more attention than the one I have mentioned. It was already late in the afternoon; the wound, in its original state sufficiently severe, had now assumed an appearance infinitely more alarming; inflammation had set in all around the joint, and threatened to proceed with extreme rapidity and violence; the

* Treatise on the Blood, Inflammation, and Gunshot Wounds, London, 1812, vol. ii. p. 438.

pain was excruciating and incessant; and the screams and groans the patient uttered indicated the most agonizing bodily torture. It was necessary that something should be done for his relief, and that too without loss of time. With a single exception, every voice, and the patient's among the number, decided in favour of immediate amputation. That exception, in spite of all his earnest entreaties to the contrary, sealed the fate of the unfortunate sufferer; the attempt to save the limb was to be made. That same evening we marched after the enemy, and I never saw him more. From some of his comrades, who soon after joined the regiment, I learned the termination of the case. He had experienced no relief from pain; the inflammation had extended all over the limb; and, worn out by suffering, and the acuteness of bodily anguish, on the 4th day he had expired.

CASE XXIV.

Of Wound of the Knee-Joint terminating fatally.

A soldier, seated on a sloping piece of ground, with his knees bent, and his legs drawn close to the thighs, was wounded by a chance shot from the rear. The ball entered the thigh, fractured the femur near its lower extremity, passed close behind the knee-joint, and came out again near the head of the fibula, after injuring that bone. Here again, in defiance of every risk, from the complicated nature of the wound, and the threatening symptoms which speedily showed themselves, the *limb-saving system* was adopted. The inflammation in the injured parts, as well as the general excitement, ran high, and the life of the patient was in the most imminent danger. His sufferings from the extension of the limb were most acute; the abatement of the first violent inflammatory stage produced but little relief from suffering; the swelling continued almost as great as ever; the discharge of pus alarmingly profuse and debilitating; the knee became implicated in the general mischief; extensive abscesses and sinuses formed in the thigh and around the joint; and, after a lapse of about six weeks, which had been productive of nothing but ruin to the constitution of the patient, and sensations of the most painful regret in the minds of the medical attendants, a moment favourable for the performance of amputation was taken advantage of—it was too late.

The following case is illustrative of the practice to be pursued in injuries of the joints; and, as it is particularly interesting from being related in the words of the patient himself, Lieutenant Colonel R. —— Dragoons, and remarkable for the

rigour of the practice, and the cheerfulness with which it was submitted to, I shall make no apology for inserting it here.

CASE XXV.

Of Wound of the Knee-Joint terminating successfully.

“Owing to circumstances of the service on the 16th June, 1815, I had a common tea breakfast, and at night, after a fifty mile march, a piece of bread, with a little spirits and beer. On the 17th I had a meat breakfast, and, throughout the day, was employed in a very severe skirmish in heavy rain. At night I took a small piece of bread, and a little spirits. On the 18th, I took for breakfast, at seven o’clock in the morning, a very small quantity of meat, and one glass of wine.

“*Sunday, 18th June, Waterloo.*—About two o’clock I received a musket-shot in the outside part of the right knee-joint; a surgeon, who saw it almost immediately, was prevented cutting out what was then thought to be the ball, protruding on the opposite side of the knee-pan, by the heavy fire of the enemy. I moved back towards the village of Waterloo, and on the road met with another surgeon, who looked at my wound, and it was decided that amputation above the joint was the only means of saving my life. The instruments were brought for the purpose, when a reiterated attack from the enemy’s cuirassiers caused orders to be issued for our immediate removal. I moved on to Brussels, where I arrived at half-past eight, P. M. I had my limb washed, was stripped, and put to bed. No dressing or application whatever was used, but I received a caution from a medical gentleman, who accidentally saw me, to take only lemonade; my diet, therefore, this day was water and lemonade.

“*Monday, 19th.*—I was recommended to send for Mr. Hennen, the principal medical officer of the Jesuits’ hospital, who was intrusted with the general charge of the wounded officers and staff. I was taught to place the most perfect confidence in him, and I accordingly wrote to him. My diet this day was entirely confined to lemonade. *Tuesday, 20th.*—Mr. Hennen did not come till towards evening, and then placed me on his own private list of patients. Before his arrival the assistant-surgeon of my own corps brought a staff-surgeon to remove the limb; but the latter gentleman, after carefully examining it, said he did not feel justified in amputating it without a consultation. Mr. H. ordered me immediately to lose sixteen ounces of blood from the arm, to apply twenty-four leeches to the knee, and to purge copiously with Epsom salts, keeping

the part covered with cloths dipped in cold water, and preventing inflammation by all possible means. His directions were complied with, and I felt relieved, but much debilitated; diet, water, and lemonade. *Wednesday, 21st.*—The assistant-surgeon called in the morning, and applied fifteen leeches; Mr. Hennen called in the evening, and ordered thirty to be applied instantly by a native surgeon, which was done effectually, and reiterated his direction to live low, and keep down inflammation by all possible means. I now felt very languid, and, in addition to my water and lemonade, took one basin of gruel and one small roll (weight two ounces) of very fine white flour. *Thursday, 22nd June.*—Bled again with thirty leeches in the morning, and thirty in the evening; some of the orifices continuing to discharge from one bleeding to the other;—diet as yesterday, with tea to my roll. *Friday, 23d.*—Sixty leeches applied this day, and the cold application continued as usual night and day. Breakfast, tea and half a roll; dinner, a very little vegetable, and half a roll; supper, gruel and a roll. Mr. Hennen made a very cautious opening on the spot where I fancied the ball was: he found a large portion of bone, but did not extract it. This whole day I had much pain and some fever. *Saturday, 24th.*—The same treatment continued, but I had only thirteen leeches; in the morning fever less; pulse very low, hard, and wiry; diet as yesterday. During the whole morning I felt very cold, and changed my bed linen, as every thing was wet about me. In the evening Mr. H. came. The cold I had complained of had become excessive; I was much shook by it, and felt wretchedly. He ordered an immediate change of application to hot fomentation continued for two hours at a time; and after that a large warm poultice to the knee. The hot fomentation increased my pulse so much, that after midnight it was more than 100 per minute. I perspired, however, and my breathing was free; and though the pulsation in my head was violent, I had no pain or other symptom of fever. The pain in the knee was much lessened, and from that period gradually diminished. *Sunday, 25th June.*—Mr. H. and the assistant saw me in the morning; all going on well, and all alarm removed. Ordered to strengthen my diet; breakfast, gruel and one roll; dinner, vegetable soup, (no meat,) one roll, coffee; supper, gruel and one roll. *Wednesday, 28th June.*—The two last nights have had slight night sweats; again ordered to strengthen my diet. A healthy discharge now came from the wound; some small pieces of bone had been removed; eleven leeches were applied on Monday evening; diet—breakfast, gruel, one roll; basin of veal soup and one roll at eleven o'clock; dinner, pea soup and one roll; evening, basin of veal soup and one roll; supper, gruel and one roll. *Thursday, 29th June.*—There had been a swell-

ing and pain on the inside of the knee, and above the joint where I fancied the ball had lodged. This morning, on removing the poultice, a considerable aqueous and bloody discharge was found on it. The swelling was reduced, and the pain diminished. The veal soup, added to my vegetable diet, had the desired effect, and I had no more night sweats.

“*Friday, 30th.*—Discharge less and of better quality; ordered to take a little meat and a glass of wine. Diet as on the 28th, with the addition of one ounce of solid meat, and one ounce of claret. *Saturday, 1st July.*—A healthy discharge, and doing well: about the 5th or 6th July, cold goulard was applied to the part, which removed a heat of the skin caused by the poultices and fomentation. Diet was now gradually increased to about three ounces of meat and two ounces of claret. I have gradually and rapidly improved in bodily strength, and the knee goes on as well as possible. The wound is closed up, and seems quite sound. *July 26th, 1816.*”

In this case the ball, the course of which was never accurately ascertained, was supposed to have lodged in the vicinity of the joint. When I saw the colonel, inflammation was about to set in; and there was considerable tumefaction of the whole limb: one orifice only appeared, and that much swollen and nearly closed in consequence. On the 6th day I felt a moveable substance on the inner side of the patella, which I imagined might be the ball; I cautiously scratched, but on discovering that it was a portion of the patella itself, fractured, but so closely connected with the original bone, that to remove it would be in effect to open the knee-joint, I replaced the skin which I had drawn over in the same mode as if I had been cutting for a loose cartilaginous body in the joint itself, and it adhered in a very short time. On the evening of the 7th day, some slight rigors, and the appearance of the knee indicated the formation of matter, which occasioned the change of application. The very rigorous treatment employed during the inflammatory stage limited this formation considerably; on the 8th day, a threatening of inflammation induced Assistant-surgeon Prosser, who paid most unremitting attention to his colonel, to apply some more leeches, which effectually stopped its progress. During the whole period, from the infliction of the wound to the change of external application on the 7th day, which includes the period of inflammation, the quantity of blood lost, including the *general* bleeding which preceded the application of the leeches, (which I would recommend always to be had recourse to, and in a very full stream,) amounted, by calculation, which I consider to be much within the mark, to 235 ounces. I think it more probable that the amount was 250, because, even in England, about one ounce per leech is the esti-

mated quantity lost, and it must be admitted that the foreign surgeons are generally more expert in their management of these animals than we are. The oozing between the bleedings was also very great, and one day particularly, even active. The quantity of food taken during these seven days, or rather during the last four, was so small, that in comparison Valsalva's diet was excess;* but to this, certainly, much of the preservation of the limb was due. Much, also, must be attributed to the previous exhaustion from want of food, and from fatigue, as well as to the powers of a sound constitution, and a cheerful mind.

The following interesting case of recovery, after a desperate wound of the knee-joint, I have received from Dr. Pockels. I had myself an opportunity of seeing Major B. in July 1815.

CASE XXVI.

Gunshot Wound of the Knee-Joint terminating successfully.

“ Major B., aged 28, of a strong and healthy constitution, was wounded on the 18th of June, and brought into hospital on the 20th. A piece of a shell had lacerated the skin of the right knee to the extent of four inches, fractured the patella in five places, and slightly grazed the anterior part of the condyle of the femur. The knee-joint was in consequence laid open, and the pieces of the patella remained attached to the capsular ligament, the tendon of the rectus, and the ligamentum patellæ. The swelling of the surrounding parts was moderate.

“ Several observations made in former campaigns had proved to me, that wounds of the joints, attended with an extensive laceration of the surrounding skin, are not so frequently followed by fatal suppuration, as those which (*cæteris paribus*) are made by a sharp or pointed weapon, or by a small ball, which merely opens the capsular ligament, without destroying the surrounding skin to any extent. This and the robust constitution of the patient, but, above all, the dread of the fatal fever, made me determine not to amputate the limb immediately.

“ *June 21st.*—The traumatic fever was moderate in the eve-

* The rigid mode employed by Valsalva for the cure of aneurisms is detailed by Morgagni, Letter 17, Article 30, and is as follows:—The patient, after losing as much blood as was deemed necessary, was confined to bed, from the commencement of the cure until its completion, restricted to a most abstinent diet, gradually diminished in quantity till he could scarcely move himself. The solid food was diminished so low as to half a pound of pudding in the morning, and half that quantity in the evening. The drink water only, and that within a certain weight, which he medicated with what he called ‘ice of quinces, or the lapis osteocolla ground down into a very fine powder. The return to a more nutritive diet was equally slow.

nings of the succeeding days, as well as the pain and swelling of the limb.

“ 24th.—A rigor before the accession of fever.

“ 26th.—Swelling of the external part of the femur, extending about six inches towards the pelvis, with deep-seated fluctuation; on compressing the femur from above downwards, some drops of pus issued from a small fistulous opening in the wound of the knee at the external part of the tendon of the rectus muscle. I made an incision at the external part of the femur, four inches in depth, and more than a pint of pus was evacuated; the abscess extended as far as the swelling, and surrounded the bone of the femur, above the vasti muscles. I was much pleased with this circumstance, and was in hopes that suppuration would not take place in the joint itself; this hope was gratified, and healthy granulations sprung up on the tenth day after the receipt of the wound. Uniform compression of the thigh and leg prevented the farther extension of the abscess, and long splints to the ham did not permit the smallest flexion of the knee. Decoctions of cinchona were injected twice a-day into the abscess, and the wound of the knee was dressed with charpie.

“ July 6th.—A portion of the patella, detached by superficial suppuration, was removed; the granulations of the wound in the knee became luxuriant, the swelling is consequently more considerable; no suppuration in the cavity of the joint, which appears to be closed by the granulations. The abscess continues to discharge a considerable quantity of pus, which debilitates the patient; fever in the evening, thirst slight, appetite good;—nourishing diet, decoction of cinchona, wine.

“ 15th.—Swelling of the knee considerable, owing to the luxuriant granulations, which hitherto I have not compressed by adhesive straps, for fear of internal suppuration. The discharge from the abscess is much diminished. Another piece of the patella easily removed from the granulations.

“ 20th.—Luxuriant granulations cover the joint; slight and equal compression by adhesive bandages; the swelling is as large as the head of a new-born infant; the abscess in the thigh beginning to close from above, but still extending towards the external part of the thigh; compression on this side by splints.

“ 28th.—Swelling of the knee continues; granulations confined by adhesive plaster; the discharge from the abscess diminishes daily. Being obliged to accompany the army, I left the patient on the 30th of July, in the state above described. Much reduced by the discharge, but the spirits and appetite good; slight fever in the evening.

“ I again saw Major B. in the month of December. The wound of the knee was completely healed, the abscess closed, and the swelling of the knee much diminished. The three pieces

of the patella remain fixed, the joint is completely ankylosed. The patient walks with crutches, but constantly wears the splints in the ham, and a circular bandage on the thigh and knee. In the following year occasional slight excoriations took place in consequence of the over exertion of the patient in walking, and mounting his horse, but they were always removed in a few days. Since 1817, he has walked without crutches, can dance and mount on horseback. He only complains of pain during a change of weather; by way of precaution, he continues to wear a splint in the ham.

"The cure of this injury was, in my opinion, assisted, 1st, By the vigorous constitution of the patient; 2d, By the great laceration of the skin surrounding the joint, which produced extensive inflammation instead of that affection concentrated in the cavity; 3d, By a large and deep abscess of the thigh, the opening of which could be directed in such a manner that the pus could not affect the joint."

On examining the joints of limbs removed after gunshot injury, it is curious to find to what an extent disorganization may have proceeded in some cases, while in others the severe constitutional effects are not at all accounted for by the lesions apparent on dissection. Many of the phenomena presented by joints affected with White Swelling, are to be observed in some of the more protracted cases of gunshot injuries, and particularly a great diminution of their specific gravity; but in those where the removal of the limb is earlier had recourse to, the effects of high degrees of inflammation, absorption of the cartilages, thickening of the synovial membrane, softening of the bony extremities forming the joint, effusion into the joint itself, and into the bursæ in its neighbourhood, are the derangements principally to be observed, the connections or organization of the bones and surrounding muscles not being affected in these early stages.

Balls often pass through or along the bones of the hand or foot, and, except in very severe cases attended with great loss of substance, amputation of the member is not immediately necessary. The strength of the fasciæ covering those parts, and the number of minute bones composing them, will, however, render extensive openings peculiarly requisite. These bones never suffer from necrosis, nor do they ever become regenerated, as far as my experience goes; but if the aid of an appropriate supporting splint, assisted by proper bandages, is had recourse to, their loss is soon supplied by a new formation of soft parts, approaching to a cartilaginous nature; and by the approximation of the sound bones to each other.

However desirable it may be to save a hand or foot, yet in severe and complicated lacerations of the wrist and ankle-joints, the frequency of tetanic affections should at once lead us to adopt

immediate amputation. Gunshot injuries of the joint of the great toe are always extremely troublesome, and accompanied with excruciating pain, often giving rise to severe nervous affections, and often terminating in tetanus; amputation of the toe will therefore be the safest mode of treatment, and it should be a general rule to amputate all lacerated toes and fingers in preference to attempting their preservation, when the injury is of a severe and complicated nature.*

Balls are sometimes, though very rarely, lodged in the cavity of the joint of the knee. I have met with no such cases myself, but they are reported on good authority; and what renders them of more importance is, that, by flexion of the joint, and by cautious incisions, they have been removed, and the limb has been preserved. Nay, Baron Percy quotes a case where the ball remained in the joint for some time, and the wound cicatrized; he also refers to other cases where they have lodged in the ankle.† On his own authority the same excellent writer mentions an instance of a ball lodging in the patella. I have met one case where, I am confident, had the ball been looked for in time, the limb might have been saved. It lay for three weeks under the ligament of the patella, until at last all distinction of parts was confounded in wide spreading inflammation.

The injuries occasioned by balls lodging near or about the joint of the hip, are among the most serious of military surgery. The fever, the profuse discharges, the tedious exfoliations, all tend to sink the patient, and are but too often fatal. In some of these cases, the course of the ball is so obscure, and its place of lodgment so uncertain, that it can only be detected after death. I have seen balls lodged in almost every part of the trochanters, neck and head of the bone, and yet the most accurate examination during life did not lead to a discovery of their situation. In the last case of this kind which I examined, we found the ball lodged deep in the great trochanter; but as the patient lay in bed, its entrance was so completely covered by the tendon of the obturator externus, as to preclude the possibility of detection. It is possible, if the surgeon is early called in, and can at once decide on the nature of the case, that the application of the crown of a trephine, aided by strong forceps, may enable him to remove the ball if thus lodged; but in general the encouragement to attempt such an operation is but slender, and little hope remains but from the performance of amputation at the joint,—a truly awful alternative.

It sometimes happens that partial fractures of the neck of the

* In these cases, however, as in all others, we shall hold in view the constitution of the patient, the state of the hospitals, the season, and various other considerations already stated at the commencement of this chapter.

† Chirurgien d'Armee, p. 163—165.

femur take place from gunshot injuries, which for a long time escape detection; other injuries also of the joint have their foundation laid on the infliction of the wound, and only develop themselves in the progress of its treatment, when little or nothing can be done for them. Of this kind I have been furnished by Staff-Surgeon Hughes with the following interesting case of spontaneous luxation:—

CASE XXVII.

Of Spontaneous Luxation of the Hip Joint.

On the evening of the 22d July, 1812, a mounted officer, of a highly scrofulous habit, was wounded by a musket ball, which entered about the centre of the dorsum of the ilium, and seemed to have passed obliquely downwards among the glutæi muscles, towards the great trochanter; its course, however, could not be traced farther than about two inches, and it could not be felt. He suffered but little inconvenience that night, and the third morning after I found him in good health and spirits, and free from pain in the wound, which was without inflammation. After some days confinement to bed, he was suffered to get up, and walked to a sofa placed at a window of his room, where he passed the day, and this he repeated for about seven or eight days; when he was moved to another more commodious quarter. About the 15th of August he was seized with excruciating pain in the groin and hip, so much so, as to excite violent screaming on the apprehension of being moved or even touched, although the wound itself and all the surrounding parts seemed perfectly free from inflammation, nor did he labour under any constitutional febrile irritation. The discharge from the wound was thin, and in small quantity.

In this state he continued with occasional temporary mitigation of his sufferings until September, when he became easier, and on the 16th of that month the wound was healed, and there appeared no difference between the wounded and the sound extremity. This case, however, was of short duration, and the wound having again opened, and the discharge become synovial, a retraction of the thigh to the extent of more than three inches was found to have taken place between the dressings. His sufferings became dreadful, and, to add to them, he was seized with dysentery. Under this accumulation of misery, he was obliged to be removed in November from Salamanca to Almeida, and from thence to Oporto. There I saw him in March 1813; the wound healed, and his health perfectly restored, but the limb permanently shortened, and the toes turned outward. I saw him

again in April 1816. The head of the femur had formed a cavity for itself on the dorsum of the ilium, and he enjoyed a considerable motion of the thigh.

Whether the luxation in this case was produced from a primary injury of the bone, or of the cartilages, and sebaceous glands of the joint, or from a secondary scrofulous affection, it is impossible to say with certainty; the probability is, that it proceeded from a combination of both, for the scrofulous dia-thesis, as is well known, is peculiarly unfavourable to the cure of every species of injury of the joint.

I have met some cases of gunshot wounds near the upper part of the thigh, in which a partial luxation was effected apparently by the irregular effusion of osseous matter, which, in the last case I examined, had formed a large tumour in the groin, that by its pressure on the nerve had produced excessive pain, and a wasting of the limb. A case of this nature is irremediable, but I have known some relief obtained by the employment of warm bathing.

CHAPTER IX.

OF CONTRACTED EXTREMITIES.

IN all the injuries of the bones and joints, and in many others which only affect the muscles of the limb, contractions of various degrees take place. These may originate either in a loss of parts, whether in the bones or the muscles which move them, or in a rigidity of the joints from the effects of inflammation, or from improper posture, generally the bent one; or a combination of all these causes may exist.

To remedy these contractions, a variety of mechanical contrivances have been had recourse to; but I am persuaded, that the more simple the plan, provided it has sufficient power, the more likely it is to succeed. That in use at Hilsea hospital is, perhaps, the most simple of any, and can be easily, and without expense, erected in every hospital. It consists of a firm wooden chair, with a strong jugum of wood, of the shape of the letter U, for confining the thigh, if the contraction is in the knee-joint; or a piece of wood with a hinge, like the letter V,

if the elbow be the joint affected; some small brass pulleys made for screwing in the floor, wall, or ceiling, with a proper cord; a shoe with three loops of iron, one at the toe, and one at each side, half way between the toe and heel, and a tin or other vessel for containing some weights. The inventor of this very simple machine I do not know, but of its utility, under Staff-surgeon Coates, and Doctor Knox, I have had several most convincing proofs.

The mode of using it for a contracted knee is as follows:—The patient being seated on the chair, the jugum, properly cushioned, is fixed over the thigh, so as to prevent it from rising, and the shoe being put on, and steadied by cords and hooks applied to the external iron loops, and fastened to the wall, a cord of whatever length may be judged proper, previously brought through one or more pulleys, and, with a hook attached to the end of it, is fastened to the loop in the toe of the shoe; at its other end is the scale or vessel for holding the weight. Now, it is evident, that, on putting a weight into the vessel at one end of the cord, the other must be acted upon; and if the weights are properly graduated, force to any degree, from the most gentle can be made use of. In the same way, the arm being secured in the hinged jugum by straps to a proper table, the cord hooked in the jugum, and first passed through a pulley in the floor, and then through one in the ceiling, as in the other case, will have the effect of gradually stretching it. The advantage gained by each trial can be measured by a common ruler. Simple or medicated frictions, or the affusion of cold or tepid water, may be employed during the time of using the pulley, and the limb may be subjected to it as often during the day as may be thought necessary. Morning and evening are the usual periods at Hilsea, and hitherto there have been no states of contraction, except those depending on ankylosis, which have not derived benefit from it.

By a judicious application of bandages, and a strict attention to posture, in the early stages of wounds, these accidents may in most cases be prevented; and in all, their future ill effects considerably lessened; but it is a matter of serious importance that a surgeon, unacquainted with military practice, should be put upon his guard against their voluntary occurrence, the frequency of which in the army has no parallel in the records of civil hospitals. The judgment and discretion of the surgeon will point out to him the means to be adopted in each individual case; it may not, however, be amiss to mention a few leading points. Permanent contractions in the joints of the fingers, and rigidity of the flexor tendons, will be always best guarded against by laying the hand flat out on a splint of wood adapted to its general shape, digitated at its extremities, and properly

secured; while, in the intervals of the dressings, a gentle motion of the fingers, thumb, and wrist, should be encouraged in the patient, or if, as often happens, he obstinately objects to it, effected by the hand of the surgeon himself. This should be done with tenderness and caution, wherever the injury may be; but if the alleged contraction or rigidity is attributed to a wound, through a part where the principal nerves have not been injured, and the muscles of which have evidently no power over the joint affected, all tenderness is criminality. (See chapter on Feigned Diseases.)

If the injury is real, and irrecoverable, as where the tendons, or a large mass of muscles, are destroyed, or if an ankylosis threatened, we must endeavour to solicit such a position as may be least inconvenient to the patient. In the knee-joint the straight position is obviously the most convenient; in the ankle, the foot should be placed at a right angle with the leg; in the elbow, the arm should be kept in the position usually employed when it is in a sling; in the fingers, the half bent position will be in general found the least liable to accidental injuries. If a cicatrix is formed on the parts affected, and is much contracted or ossified, the cure should not be despaired of before the effects of incision are tried, from which good effects have been derived on many occasions.

In the treatment of fractures, a false ankylosis, or a stiffness of the joints, which are necessarily immovable during the cure, must take place to a certain extent. This was combated by the older surgeons, by fumigations with the smoke of aromatic gums or balsams, as benzoin, &c. The application of simple heat by steam, gentle friction, and moderate exercise of the joints, will soon restore their mobility. It is in the joint situated below the fracture that the most serious stiffness occurs, according to the observations of Professor Boyer, and to this, consequently, the attention should be more particularly directed.

I have met lately with a secondary species of contraction, which admits of no relief that I am acquainted with. A sergeant had his pike wrenched out of his hand by a grape-shot, which struck the shaft of it. He felt no inconvenience at the moment, but shortly afterwards he complained of a prickling sensation, and loss of power of the root of the thumb. This lasted at intervals for twelve months, when a gradual wasting of the muscles took place, the thumb doubled inwards to the palm of the hand, and at last became so immovably fixed, that no degree of force which could with prudence be used, could restore it to its natural situation.

In some contracted cases which have fallen under my observation, the muscular fibres have been observed either to be ruptured, or forcibly separated from each other, and sometimes ab-

sorbed to such a degree as to be unequal to the act of bending the limb. In one or two instances, an osseous deposition has been remarked on their bellies and their tendons. These cases admit of no cure.

The French government has long since established military hospitals, in the immediate neighbourhood of some of the most celebrated hot springs in France, for the use of its sick and wounded soldiers, and, however we may explain their operation, the fact is, that vast numbers of men who have laboured under violent contusions, sprains, contractions of the joints, muscles, and tendons, thickening of the ligaments, tedious exfoliations, incipient ankylosis, fistulous ulcerations, wandering pleuritic pains, cutaneous affections, &c. the consequence of gunshot injuries, have derived the most serious advantages from the employment of these waters as baths. The hospitals are erected at Bareges, Digne, St. Amand, and Bourbonne-les-bains. The first of these places is best known to our countrymen, several of whom have resorted thither. It is obvious, however, that the benefit of these waters are only to be obtained by a few officers of rank and fortune. To these it may be of importance to know, that the best season for the baths of Bareges and Bourbone-les-bains, is considered to be from the month of May to October; those of Digne, from May to September; and those of St. Amand, near Valenciennes, from June to September; there are also at the latter place *mud* baths, which are much resorted to. The waters of Bareges are of the sulphureous class, and raise the thermometer, at different springs, from 73° to 130° of Fahrenheit; they are remarkable for their soapy feel, and for rendering the skin soft and pliable. The French army surgeons conceive them injurious in aneurismal affections, and in diseases of the heart, in penetrating wounds of the thorax, and phthisical cases. The baths of Digne and St. Amand are also sulphureous; those of Bourbone-les-bains are saline. Besides these, there are some other medicinal springs in France, celebrated for their efficacy in the sequelæ of gunshot wounds; Bonnes, near Pau, the waters of which were formerly styled "Eaux d'Arquebusade;" Bourbone, near Moulins, where there are also mud baths similar to those of St. Amand; and Bagnères near the Spanish frontiers. This last is celebrated for the removal of the nervous affections which remain after gunshot wounds.

It is certainly well worth consideration whether the numerous wounded soldiers of the British army might not be seriously benefited, at a very inconsiderable expense, by the erection of a military hospital in the neighbourhood of the hot springs which our own island affords. On this subject I cannot pretend to enlarge; but I would beg to suggest to those in authority the

great utility of having fixed baths to the different military hospitals; a small apartment near the kitchen or wash-house might, with great ease, and at a very trifling expense, be fitted up with bathing tubs, and tubes communicating with the ordinary boilers; or the highly ingenious plans of Mr. Sylvester might be adopted * Every hospital, it is true, has a slipper and shower bath among its articles of barrack furniture, but, from a variety of causes, they are seldom employed to the extent that they might, and that they assuredly would be, if more facilities were afforded for their employment. As they exist at present, they occasion great increase of labour and expenditure of fuel, and are a source of much noise, filth, and irregularities in the wards; hence they are always reluctantly prepared by the hospital servants, and often applied in a very imperfect and slovenly manner.

CHAPTER X.

OF INJURIES OF THE BLOOD VESSELS.

IT is a popular opinion among surgeons, and even soldiers, and in a great measure a well-founded one, that a bleeding gunshot wound is highly dangerous. A small vessel, or congeries of vessels, suffers immediate death from the rapidly inflicted contusion of a ball, and the wound in which they lie either discharges a few sluggish drops, or its hæmorrhage ceases after a momentary spirt, and a secondary kind of oozing. A moderate sized vessel often bleeds actively, but within the power of timely assistance. A large artery, on the contrary, pours forth its fluid contents, if not to a fatal extent from quantity, from the deranged balance of circulation which the wound produces, death is most commonly the consequence. Much of the flow in all cases will depend upon the vessel being cut quite across and admitting of retraction; much will depend upon a small ball or sabre cut partially opening the vessel in its transverse or

* I cannot specify these here. Every person interested in hospitals should study Mr. Sylvester's book. It is entitled "The Philosophy of Domestic Economy, as exemplified in the mode of Warming, Ventilating, &c. adopted at the Derbyshire Infirmary." 4to. London, 1819.

longitudinal direction; but fatal experience shows us, that the numbers who die from the opening of a large and principal artery by shot, shell, or sabre, however inflicted, so pre-eminently exceed the survivors, as to set all calculation at defiance.

How the vessels escape so often as they do, has been a source of great surprise among surgeons, and is truly wonderful. Balls buff along them, pass between them, and traverse their courses in all possible directions, but leave them unhurt.* Their elasticity has been considered as in a great measure contributing to this effect, and no doubt it does; something also may depend upon their being in a state of dilatation or otherwise when the missile passes across them, but still much is left unexplained in the attempt of accounting for these phenomena.† Where a round shot injures a large vessel, or a sabre divides it, (the carotid for instance, or the femoral,) immediate death is almost universally the consequence. Where a vessel of this class is opened within the cavities, no chance of recovery remains; the cause and effect are almost simultaneous, and even in the first case death amounts so near to certainty, that a bare possibility of escape is left, and no practical deduction can be drawn from a few solitary instances to the contrary. It must be recollected, however, that if a limb is entirely carried off, or if it is excessively bruised, little or no bleeding takes place: the vessels are paralyzed, and their organization almost destroyed; the effect is nearly the same as if they had been actually seared, a process to which the older surgeons, who were so familiar with hot irons, often compared it. A very singular instance of escape is given by M. Larrey in his *Mémoires*, in which an aide-de-camp received a gunshot wound, which cut the external carotid at its separation from the internal, and at its passage through the parotid gland. The immediate application of pressure from the fingers of an intelligent soldier upon the spot, and M. Larrey's subsequent bandages, saved the patient. I know of an English officer who was also saved in India from the effects of an arrow wound in the carotid by the same means. In the 9th volume of the *New Medical and Physical Journal*, p. 95, is given the case of a man wounded in the femoral artery at Spithead, and saved by a subsequent operation at Haslar hospital; and in the 3d volume of the *Medico-Chirurgical Journal*, p. 2, is given an

* A case was reported as having occurred in Flanders, where the ball passed close under the arch of the aorta, and the patient survived some days. The ball certainly passed in that *direction*, but not having examined the body after death, I cannot vouch for the fact.

† See Morgagni, Letter 53, Obs. 34. Dr. Parry has denied the dilatation of the arteries, but, as this question is foreign to my subject, I shall merely refer to his "Experimental Inquiry into the Nature, Cause, and Varieties of the Arterial Pulse." Bath, 1816.

instance of the carotid bursting and being taken up on the spot by the late Mr. Fleming, a naval surgeon.

We have occasional opportunities in the field of at once tying the extremities of lacerated arteries, and these should never be neglected, although perhaps in every case not indispensable. These occur where a limb has been carried off by a cannon shot, and where the vessels hang out like cords from the wound, without the least flow of blood from them; or where the extremities of the wounded vessels can be seen partially throwing out their blood in the bottom of a deep wound. In these, and in all other cases of divided arteries, the least reflection upon the anastomoses of the vessels will lead us to secure both the end next the source of circulation, and the more remote extremity. Mr. Guthrie, in his excellent cases inserted in a periodical publication,* has called the attention of military surgeons to this point, and his observations cannot be too forcibly impressed on their minds. But many cases occur where nature has herself completed the entire process of cure without any interference of the surgeon. I owe the following to that very able and experienced officer, Dr. Dickson of Clifton, physician to the fleet.—

CASE XXVIII.

Arteries divided without Hemorrhage.

“Sergeant Kelly, of the 54th regiment, in the battle of the 13th of March, 1801, in Egypt, had both arms shot away at the elbow-joints by the same cannon ball, and on the following evening was received, with a great number of wounded men, on board the Braakel, of which ship I was surgeon. On removing the dressings, I was much surprised to find no appearance of a single blood-vessel being tied by ligature. Conceiving, I imagine, the case to be desperate, a piece of linen had been merely wrapped round each stump, and the supervention of syncope seems to have saved his life, by stopping the farther effusion of blood. The left arm, which was the most ragged, and having the olecranon still attached, was amputated; but from the low state to which the man was reduced, and the pressure of other cases, I was obliged to postpone doing any thing with the other arm; and, considering, after the time had elapsed, that there was but little danger of bleeding, and wishing to see the result, a tourniquet was merely put on loose. The second operation could not be performed until the 25th,

* New Medical and Physical Journal, vol. iv., and also in the excellent work of Mr. Hodgson.

and the dissection of the amputated portion then satisfactorily showed that ample provision had been made against the possibility of such an occurrence; for the end of the torn artery was completely obliterated and lost in the surrounding flesh, and for upwards of an inch from its extremity was described, by the surgeons who assisted me, to be solid, organized, and carious. I say described, for, while on other duty, it had been thrown overboard. "The poor fellow feavered, and died on the 4th of April."

From a few dissections which I have been able to make in similar cases, I can confirm this report of the appearances. But in the dissections and observations made by some eminent men, in experiments instituted expressly for the purpose, or undertaken under circumstances favourable to the elucidation of the point, where accidental injuries have presented themselves, clots of blood, or of coagulable lymph, or membranous septa, have been found at unequal distances from the orifice of the artery, and at distant points of time, so far as three weeks after the infliction of the injury. Dr. Thomson, who for many years has paid unremitting attention to this subject, has found the internal coat burst on some occasions of non-bleeding ruptured arteries. The process of nature by which hemorrhage is stopped, appears to be as follows: On the first opening of an artery, the vessel retracts within its sheath suddenly, and with considerable force; the blood which continues to flow notwithstanding this retraction, is effused into the cellular substance between the vessel and its sheath, as well as into the more distant cellular texture; there it coagulates, entangled among the stretched and lacerated fibres, and shortly fills up the open orifice of the vessel. This process is greatly assisted by the weakness and faintness consequent upon the loss of blood. Besides this external coagulum, Dr. Jones describes an internal one, produced from the quiescent blood which lies between the wound and the first collateral branch. The next step in this important process is inflammation and the effusion of coagulable lymph, by which the surrounding parts are soon firmly united. The same process of nature takes place in that part of the vessel most remote from the heart. The impervious part of the artery gradually shrinks, and is converted into a ligamentous substance, while the enlargement of the inosculating branches establishes a complete communication between the divided ends of the vessel. In Dr. Jones' unrivalled Treatise, where many of the original experiments conducted by him and Dr. Thomson are detailed; in the excellent Treatise of Mr. Hodgson, where Mr. Guthrie's cases are republished; and in the papers of Messrs. Lawrence, Travers, and Crampton, in the Medico-Chirurgical Transactions, is to

be seen the sum of all our present knowledge on this subject.*

It is in the hospital that our most guarded attention is called for, and our most saving efforts made, in the expectation, or actual occurrence of secondary hemorrhage. In those cases, we must avail ourselves of every assistance which the history of surgery has from time to time presented to our notice. To pressure, to cold, and to styptics, we must give their due value, and a full trial to such an extent as prudence may warrant; but it is to the actual ligature of the vessel that we are to trust in all cases where a trunk or important branch is injured; and in cutting for them, correct anatomical knowledge is our only resource. Often, unfortunately too often, we find, that even this will not enable us to meet the exigencies of actual practice, and that the *mere* anatomist has made but one step to being a perfect surgeon; a principal one, indeed, but no more conclusive, than the tributary arts of the chisel or the pencil are to the formation of a perfect architect. Much unmerited blame has been thrown on the army surgeons, on this as well as other points, by men who, with a minute knowledge of the natural structure, have not adverted to the pathology of wounded vessels. They prick for arteries in a dead subject, and they readily find them: but the state of a blood vessel in a wounded limb is very essentially different from what it is in a sound state, or in a body laid on the table for the practical purposes of anatomy; and I have more than once seen a person of this class, after having cut upon a living blood vessel with the utmost precision, and described its course with the most laudable minuteness, confess, with great surprise, that he was unable to secure it, and had actually left his patient much worse than he found him. The state of general health, the cause, extent, and nature of the wound, the diseased state of the vessels, or their natural connexions, the "*engorgement*" of the parts with extravasated blood, or putrid sanies, the possibility of irretrievably injuring the limb by cutting its nerves or the tendon of some muscle essential to the due performance of its motions, should all be minutely examined, and balanced in the operator's mind; and he will have certainly the best claim to the character of a judicious surgeon, who saves the limb of his patient, if possible, but who does not hesitate between the probable salvation of it, and the certain loss of life.

But cases will occur, where, under circumstances the most promising to the patient, the loss of his limb is the sole means

* A Treatise on the Process employed by nature in suppressing Hemorrhage, Lond. 1805. By J. F. D. Jones, M. D. Hodgson on the Diseases of Arteries and Veins, Lond. 1815. Medico-Chirurgical Transactions. vol. iv. vi. &c

of preventing the loss of his life. These are cases, where an artery unfortunately gives way in the bottom of a deep wound, and where, by a few pulsations of the heart, the interstitial spaces of the muscles, and even their component fasciculi of fibres, are so completely injected with blood, that the distinction of parts becomes lost, and the vessel is not to be detected. This is an accident which I have seen more than once in military hospitals, in the view of the attending surgeons, men of boldness, humanity, and dexterity. But even among the less tumultuous scenes of a civil establishment, and during the routine of diurnal duties, the same unavoidable accident will occur. From within the walls of one of the most eminent, and under the cognizance of some of the most able surgeons, I select the following example, of great interest and high value in a practical point of view.—

CASE XXIX.

Arterial Hemorrhage, source unknown.

A middle aged man was brought into one of the hospitals of the capital, for a compound fracture of the left tibia, unaccompanied either by extensive laceration or contusion. He was placed under the charge of an excellent assistant, and the limb, for some weeks, seemed to be doing well, when suddenly hemorrhage came on during the dressing, the assistant at the bed-side, and the surgeon of the hospital expected every moment. He lost about 20 ounces of blood before the artery of the groin was effectually compressed, and the tourniquet applied.

The most diligent search could not detect the bleeding vessel. Amputation was therefore had recourse to. On examination of the arteries, it was some time before the branch from which the hemorrhage had proceeded could be discovered. It at last was found to be the anterior tibial, and the orifice in it was so minute, as with difficulty to admit *three hog's bristles*.

In another case, with which I have been favoured by Dr. Thomson, a fatal secondary hemorrhage occurred about the 30th day after a pistol shot in the upper part of the thigh, where no trace of the wound of an artery could be detected, *even by the aid of injection of the deceased limb.*

Where a ball has passed close to, or lodges near or upon a principal blood vessel, the utmost caution as to excess of every kind is to be most rigidly observed; and more particularly when the sloughs begin to separate, and the eschars from the arterial coats may be naturally supposed to loosen. And here I must entreat the young army surgeon not to allow himself to be lulled into a fatal security, by a supposition, that secondary bleedings from gunshot wounds are but of imaginary import-

ance, and of rare occurrence. The supposition is absolutely erroneous.

Experience shows, that from the 5th to the 11th days are in general the critical periods to be watched. Dr. Thomson, with that accuracy and discrimination which characterized his writings, divides secondary hemorrhages into three species, taking place at three distinct periods; hemorrhage from increased determination of blood occurring from the 1st to the 5th day; hemorrhage from sloughing of the arterial coats from contusion from the 5th to the 10th; hemorrhage from ulceration of the coats of the vessels from and after the 10th to any distant period. To these the Doctor adds, what he appropriately compares to the spontaneous hemorrhage from capillary vessels opening on mucous surfaces; a species occurring at a late period, and peculiarly connected with excesses.*

Severe, and often fatal, hemorrhage occurs now and then from the large venous trunks, as well as from the arteries. If these vessels are within reach, and pouring out their blood profusely, I should not hesitate to tie them, although some ingenious objections have been made against ligature of the veins, on account of their well-known disposition to inflammation; a point on which I shall enlarge hereafter. I believe there are few, if any, army surgeons of the present day, who would not be as averse to applying a ligature to a vein, the hemorrhage from which could be stopped by pressure, as he would be to leaving an artery uncured, even though it did not bleed. Yet cases will occur, especially in amputation, where the large veins may, under certain circumstances, be secured with a fine ligature, not only without danger, but with advantage; in truth, if there was such imminent danger as has been apprehended, the needle, by which the vein was included in the same ligature as the artery, before the tenaculum came into general use, must have been a most destructive instrument; thousands of successful operations, however, attest the contrary.

When a bleeding artery is in a state of perfect health, and within reach, then the actual ligature, is, beyond all question, the proper means of relief. By careful dissection the vessel may be traced from the wound itself, and must be secured by a fine silk ligature on each orifice, drawn sufficiently tight to cut the internal and middle coats of the artery, which, although not indispensable, greatly accelerates the adhesion of the opposite sides. If, however, as often happens, the original breach in the vessel cannot be discovered, or if, in the prosecution of our search after it, a number of enlarged and newly formed collate-

* Report of Observations made in the British Military Hospitals in Belgium, Edinburgh, 1816, page 44.

ral vessels are opened, and a general oozing takes place, the main trunk above its first branch in the vicinity of the wound, or at its nearest and most convenient part, should be secured. If the operation is performed before the patient is debilitated by excessive loss of blood, and when his constitution is yet sound, and unaffected by fever, which remarkably predisposes to rupture of vessels; or before the occurrence of gangrene, there is reasonable hope of success; but where he is suffering under disease, the vessels, whether in the wound itself, or much nearer to the heart, burst but too often under our ligatures, or ulcerate soon after their application, and leave amputation alone as our last resource, and even that resource not always to be depended on.

The reducing the immoderate size of ligatures; the separating the threads of which they were composed, and placing them in convenient points along the face of the stump or wound; the actual removal of one half of the ligature employed in securing the arteries, as soon as it had served its purpose of effecting the knot;*—all these were progressive, and arrived at by very slow degrees; but an improvement, which appears to me of great consequence, was the last of introduction, and is now the slowest of adoption, although the artery once secured, and the value of adhesion duly acknowledged, it is the most obvious of all. I allude to the plan of removing the ends of the ligature altogether, and thus leaving to an extensive wound the greatest possible chance of immediate union.

There are few practical surgeons who must not have occasionally experienced great inconvenience from the length and thickness of their ligatures. Independent of their acting as foreign bodies, they often prove a great source of irritation, even under the most delicate management; but when they get incrusted with blood or pus, or are entangled in the dressings, especially if in the hands of young and inexperienced assistants, they are often a source of infinite uneasiness, and even danger to the patient. An ingenious foreigner, M. Roux, surgeon of the extensive establishment of La Charité, where he must have often felt these inconveniences, acknowledges that the project of cutting all the threads of ligatures, made on the surface of a

* For this very serious improvement in ligatures, we are, I believe, obliged to a naval surgeon, James Veitch, Esq. late of the Naval Hospital, Plymouth, who, in a modest and convincing paper, published in the Edinburgh Medical and Surgical Journal, vol. ii. p. 176, under the title "The Inquirer," and with the assumed signature of J. D., gives an interesting account of it. It is sufficiently well known, that Paré revived, or rather reinvented, the ligature, in the latter part of the 16th century; it had been previously known to Celsus in the 1st, but had not been applied in amputation before the time of Paré, although frequently employed by Galen, Paulus, Aegineta, Avicenna, Guy de Charliac, &c. in accidental wounds of the blood vessels.

wound that is to be healed by the first intention, had long since suggested itself to his mind, without his having dared to do any thing in it. His visit to the hospitals of London was made in 1814, and he was so well pleased with the result of an attempt made by Mr. Lawrence at St. Bartholomew's, that he evinces an inclination to claim for French surgery the honour of having conceived the same idea. The practice, however, belongs neither to France nor to Mr. Lawrence. It is of British origin, and I believe was first practised by a naval surgeon at Haslar hospital; a fact with which I was not acquainted¹ until long after I had published the first edition of this work, and after I had claimed the merit of having been the first British army surgeon who followed the practice and circulated the account of it; although I disclaimed all pretensions to originality. Some merit, humble though it be, I still believe I possess, and I shall not sully it by withholding justice from others; but, before stating what farther inquiry has enabled me to collect, I shall detail my own experience on the subject.

In the early part of September 1813, an ingenious young gentleman, Assistant staff-surgeon Hume, then in charge of a large ward filled with gangrenous cases, suggested to me, what he informed me he understood to be the practice of an American naval surgeon, (to which he was led, if I mistake not, by an accident,) viz. cutting the ends of the ligature off close to the knot, and allowing the parts to heal over it. I was much struck with the proposal. Independent of the plausibility of the plan, as promoting immediate union, I anticipated good effects from any accidental violence to the ligatures, or the intrusive interference of the younger dressers to accelerate their loosening being thus prevented; for I had seen several instances, where, from the most gentle efforts, the ligatures were removed from the diseased vessels, and alarming hemorrhages took place. The plan was therefore adopted; thirty-four cases were at different times, between September and the January following, treated in this way; and as no inconvenience whatever followed, nor did the small particle of silk left behind give rise to any apparent irritation, I made a very favourable report of the "short cut ligatures" to Dr. Charles Forbes, deputy inspector of hospitals, and then principal medical officer of the station, in my monthly report for October, and through him to Sir James M'Grigor, the head of the staff, presenting him at the same time with some of the small circles of silk, a part of which had come away with the dressings, while some had floated out on opening the little pustules, which formed over the face of the stump, at the points where the arteries had been tied. Some few of the ligatures never made their appearance, and the patients complained of no uneasiness whatever.

Fully impressed with its utility, I recommended it on all occasions in conversation, and in the operation-room; and, on my arrival in England from the south of France, published an account of it in a paper, which appeared in the London Medical Repository, upon the subject of Hospital Gangrene.* Upon presenting this paper to a very ingenious practitioner, Dr. Maxwell of Dumfries, I found that he had adopted the plan, as far back as 1798, and had not only been in the practice of it himself since that time, but, at his recommendation, it had been adopted in various operations, by more than one surgeon in the neighbourhood, with unvarying success. He was convinced that the silk, as an animal substance, is absorbed, after having suffered a decomposition. On this point I cannot speak with certainty. I have, however, dissected several stumps, at different periods, from eight to twelve weeks after amputation, where the patients have died of diseases unconnected with the operation, and where the little circle of silk has lain quietly at the shrunk ligamentous-like extremity of the artery, in a small cyst, formed by a thickened cellular membrane; but its more common fate is to be discharged with the dressings. The campaign of Waterloo furnished me with many additional proofs of the excellence of this plan, and whatever may be the intention, whether to heal the wound or not, I now never hesitate about cutting short the ends of the ligatures. A single thread, well waxed, (or at most two) is quite sufficient for any ligature; the artery should be well drawn out from its sheath, and the ligature placed as high as possible. The natural retraction of the vessel will in most instances carry it out of sight; and unless gangrene or excessive sloughing takes place, it will frequently never more be heard of, and, I am convinced, never will do harm.

Mr. Guthrie, in his work on Amputation, makes an objection to the short cut ligatures; and, as every suggestion of his is entitled to the utmost attention, I shall state his observations, which upon the whole, are favourable to the mode I recommend, and then very briefly remark upon them, as far as my experience authorizes me to do. At page 94, he observes, "I know that many cases treated in this manner in the campaign of 1813 ended successfully, and healed in as short a time, as the most favourable ones by the usual method; and at Montpelier, in June, 1814, M. Delpech, professor of surgery in that university, showed me at least 20 cases, in which he had and was still practising this method with success." (I find that the Professor adopted it in the same disease as I did, the hospital gangrene.) "I have seen, however," continues Mr. Guthrie, "in two or

* See vol. iii. p. 177, and vol. v. p. 221.

three instances, some ill-looking abscesses formed by them, and I suspect some disagreeable consequences will occasionally ensue if this practice be continued." In opposition to this *suspicion*, I can with the most perfect confidence appeal to all those gentlemen who saw the practice, and assisted in it at Bilboa,* in cases of the most irritable and threatening nature, and to Messrs. Bingham and Crofton, my confidential assistants at Brussels, who saw it adopted repeatedly there by me, and assisted in the after treatment, for supporting me in the assertion, that neither pain, heat, nor tumour, febrile exacerbation, or formation of pus, could be fairly traced to the short cut ligatures, which would not, in all human probability, as readily have succeeded to the ligatures usually employed; while, on the contrary, the progress of healing has been sensibly more rapid where they have been used. Mr. Guthrie considers the improvement as very valuable in all cases that will not unite by the first intention from its lessening irritation; adopting the practice, as he says, "in a view diametrically opposite to that of its advocates,—but it will be found very advantageous in all cases of operations performed in unsound parts, or in irritable or bad constitutions, where union will not take place, or only in a slight degree."†

Mr. Lawrence, who it appears, was as ignorant of what I had done, as I was of what had been done by others, read a very interesting paper to the Medico-Chirurgical Society in July, 1814, which was afterwards published in the 6th volume of their Transactions. At that period he had employed the short cut ligature in ten or eleven amputations, in six operations on the breast, and in the removal of two testicles. Of these operations one only was unfortunate; it was the case of a man whose thigh was amputated, and who died of an affection of the lungs; all the others succeeded perfectly, without abscess or

* The opinion of Dr. Cummin of Glasgow may be seen in a letter, addressed by him to Mr. Lawrence, and published in the 8th volume of the Med. Chir. Trans. p. 495. He says, "The practice appeared particularly advantageous in the hospital near Bilboa. I never saw, nor, until the publication of Mr. Guthrie's book, did I ever hear of any bad effects following the use of short cut ligatures."

† See Med. Chir. Trans. vol. vi. p. 156, and vol. viii. p. 490, for Mr. Lawrence's papers. As I am only anxious for the fair investigation of this subject, I would also refer to an ingenious paper in the Lond. Med. Rep. vol. vii. p. 353, by Mr. Cross, whose deductions, principally from experiments on brutes, are not in favour of the short cut ligatures. Dr. Thomson, who frequently saw me use them at Brussels, informed me, that in experiments which he had performed on dogs, he found the large short cut ligatures which he then used, work their way out through the integuments, at points distant from their application on the large arteries, and without producing any injury whatever. My friend Dr. Fergusson, inspector of hospitals, since tells me, that in a tour through Sweden, during the peace of Amiens, he witnessed the employment of them by the surgeons of Stockholm, and without any inconvenience resulting from their use. See also Cooper's and Travers' Essays, Part 1st.

other inconvenience. That kind of silk twist called dentist's silk, is the substance he employs for his ligatures, so minute that the finest, after the knots are tied, and the ends cut off, do not exceed in weight the sixtieth part of a grain. In a subsequent volume of the same work, Mr. Lawrence gives a still farther testimony in favour of the short cut ligatures. He states, that since his first communication he had constantly employed the method both at St. Bartholomew's and in private practice, and he says that the general result of his experience is, "That this plan, by diminishing irritation and inflammation, and simplifying the process of dressing, very materially promotes the comfort of the patient and the convenience of the surgeon, while it has not produced ill consequence, or any unpleasant effect, in the cases which have come under his own observation.

"I have found," he continues, "in my own practice, what has been confirmed by others, who have communicated to me the result of their experience, that the small knots of silk generally separate early, and come away with the discharge; that where the integuments have united by the first intention, the ligatures often come out rather later, with very trifling suppuration, and no painful inflammation, and that in some instances they remain quietly in the part.

"In two or three instances I have been told that the ligatures seemed to have caused irritation and pain. These were amputations; and we are accustomed to see effects quite as considerable as were alluded to here, produced by the state of the bone, and other causes, where the ordinary method of securing the arteries is practised; so that I could not, on close inquiry, find any reason to ascribe what was complained of to the use of the silk ligatures, and the practice of cutting of their ends close to the knots." Med. Chir. Trans. vol. viii. p. 490.

In a paper on the Ligature of the Aorta, by Mr. Astley Cooper, contained in the first part of his valuable Essays, that eminent surgeon states as follows:—"My friend, Mr. Lawrence, has proposed that the silk usually employed for ligatures should be cut off close to the knot, so as to heal the wound over it. It has occurred to me, that catgut would answer the purpose better; and I shall give the result of the trial which I have made, wishing it to be understood that I consider the subject at present as undecided, and only as one for future investigation.

"Catgut, employed as a ligature, being more of the nature of the animal matter in which it is embedded, will be more easily absorbed than silk; or, if even not absorbed, will be less likely to excite irritation in the parts," p. 126. He then details a case in which a catgut ligature previously soaked in water, about the temperature of 100° , was employed in a case of popliteal aneurism, and both ends cut off, the edges being then

closed together by adhesive straps. The patient was a man of the advanced age of eighty, but in good health. The operation was performed at Guy's hospital, on the 24th of October, 1817; the wound was *completely* united on the 28th, and the cure was perfected without any appearance whatever of irritation from the ligature, by the 17th of December following. In three weeks after the operation, this man walked about in the ward with the aid of a crutch, and never suffered any constitutional irritation whatever throughout the course of the cure.

I shall now add to these testimonies in favour of the short cut ligature, another which I have but recently met with, although given in a well-known periodical publication. I consider it as of high value, from its enabling me to do justice to unassuming merit, as well as from the facts which it contains. It also may serve to fix the date of the first introduction of this improvement as far back as the year 1786 *at least*, and probably much sooner. In a paper in the 7th volume of the London Medical Journal, entitled "Remarks on Mr. Lucas's Practical Observations on Amputation, communicated in a Letter to Dr. Simmons, F. R. S. by Mr. Lancelot Haire, Surgeon at Southminster in Essex, Member of the Corporation of Surgeons of London, and formerly Assistant-Surgeon to the Royal Hospital at Haslar," the author, at page 389, states as follows:—"With respect to the success of healing the stump by the first intention, at Haslar hospital, it always exceeded our expectations in emaciated subjects, and when the constitution had been previously much reduced; but where it was performed on subjects in full health, in cases of accident, it did not succeed,—a violent inflammation and swelling coming on, burst the adhesions, the muscles shot out, and occasioned almost as open a stump as in the old method of operating. The ligatures sometimes became troublesome, and retarded the cure. An intimate friend of mine, a surgeon of great abilities, proposed to cut the ends of them off close to the knot, and thus leave them to themselves."

"By following this plan, we have seen stumps healed in the course of ten days. The short ligature, thus left in, commonly made its way out by a small opening, in a short time, without any trouble, or the patient being sensible of pain."—*Southminster, Essex, November 1st, 1786.*

Considering the thickness of the ligatures in use at the above period, this testimony to their success is very satisfactory; although Mr. Lucas, in his Reply to Mr. Haire, contained in the 8th volume of the above-named work, p. 142, takes no notice whatever of the proposal.

For many years past silk has been the material chiefly used in the army for the formation of ligatures; and I believe it to be the best. I have little doubt, however, that on emergencies

an army surgeon might successfully avail himself of an artery or vein dissected from the amputated limb. By experiments I know, that either of these substances are sufficiently strong for the purpose; and they might be easily removed from the dismembered part. They certainly would be less of the nature of extraneous bodies than any other that could possibly be imagined. It is not probable that any deviation from the ordinary material will ever be required, except on particular occasions; but if the experiment is ever tried, it should be performed in a limb in perfect health; as, for instance, in those injured by machinery, gunshot, or other sudden violence, where there exist no fears of communicating gangrene, or any other disease, by inoculation. A nerve, or a portion of tendon, will serve a similar purpose. Hair also suggests itself, as an animal substance, of which we can avail ourselves more immediately than any of the others.

Gunshot injuries often lay the foundation for aneurisms. There are some instances, however, where our interference is not only highly improper, but often fatal. These are the cases where a ball, passing close to or between the artery and vein of a limb, but without primarily opening either, has so far predisposed the parts to sloughing, that an eventual varicose aneurism is formed.

The following case illustrates the progress and symptoms of this injury of the blood vessels, and the fatality of operation. I shall briefly relate it, premising that moderate pressure, open bowels, and abstinence from every species of excess, form the rational mode of treatment; and that, if operation is deemed necessary, ample time should be allowed for the growth or enlargement of anastomosing and collateral vessels; and a much longer period, it is to be observed, will be required in a case of this kind, than in that where the whole undiminished force of the ventricle, and of the peculiar arterial action which prolongs the impulse, is employed upon the column of blood.

CASE XXX.

Varicose Aneurism of the Femoral Artery.

Private _____, of the _____ regiment, aged 24, received a musket ball at Waterloo, in the fore part of the right thigh, which brushed along the course of the femoral artery, about half an inch above the giving off of the profunda; it passed inwards and lodged. The wound healed without the smallest untoward symptom, and the man was soon so well, as to be employed about the wards. He left the hospital under my immediate

charge, early in July, and on the 18th of the same month, or the 30th day from the wound, he was taken into another hospital as an orderly. On the 61st day, he complained of a tumour which had been forming for three weeks, and had been attended with much pain. It came on, he said, in the act of running up stairs in the hospital, after having drank Lord Wellington's health. The extent of this patriotic draught I ascertained to be nearly one pint of brandy, and some quarts of strong Brussels beer, swallowed within three hours in an adjacent brothel, where he had passed the night with a most abandoned crew of Belgian prostitutes. I was called in at a very early hour of the morning, to see the case, and I found an irritable pulsating tumour, about the size of an egg, on the apex of which appeared the cicatrix of the original wound. It disappeared on pressure, and, the neighbouring cutaneous veins, (which were all remarkably full, and, if emptied by the finger run along them, instantly filled on its removal,) swelled in proportion as the contents of the body of the tumour were pressed out. The limb in all other respects appeared perfectly natural. I requested the staff-surgeon who had called me in, to mark this peculiarity, and I directed his attention to the sibilant and tremulous jarring motion of the veins, clearly distinguishable on each pulsation of the heart. This peculiar noise, motion, and compressibility, had been more perceptible; and, soon after my first examination, had ceased entirely.

I deprecated all attempts at operation, as I was decidedly of opinion, that a communication had been formed between the artery and vein; and the plan of cure then proposed was the immediate abstraction of 20 ounces of blood from the arm, the application of a cold saturnine lotion externally, the internal use of the tincture of digitalis, and a rigid diet on the plan of Val-salva. I heard little more of poor —— except his dying groans. In an evil hour, an operation of tying the external iliac had been proposed and performed, some time after I had ceased visiting him. In less than 60 hours afterwards he was no more, gangrene having supervened immediately. Not a drop of blood had been transmitted to the limb, and the truth of my prognostic was publicly proved, by a communication which appeared between the vessels on dissection.

A case where a varicose aneurism occurred in consequence of a wound of the left carotid and jugular vein, is given in the Bulletin of the Faculty of Medicine of Paris, for 1819, No. 6. The symptoms were great dilatation of the vein, which communicated a peculiar thrilling as far as to the clavicle; undulations corresponding to the arterial strokes, perceptible to the eye, and a sound to the ear resulting from the passage of the blood through the unnatural opening; there was a small tumour, which dimi-

nished on pressure, but its volume and pulsation were unchanged by pressure on the artery below: the left arm was numbed and painful. This case occurred to Dr. Desparanches, who very judiciously left it to nature; the man's health was good, and the tumour was not increasing.

Varicose aneurisms may also arise in consequence of a passage having been formed between a vein and artery by wounds from pointed or cutting instruments. That at the bend of the arm, occasioned by accidents in venesection, is the most common form. Baron Larrey, however, gives examples from punctured wounds in other situations. One in the ham, one in the armpit, and one in the upper part of the breast, near the articulation of the sternum and clavicle, (vol. iv. p. 341.) This case underwent a spontaneous cure. As we have examples of injuries of this kind continuing without any detriment to the patient for twenty and thirty years, it is, in my opinion, both unnecessary and injudicious in the extreme to attempt any operation. It becomes a different case where an artery alone is engaged; there, after giving a fair trial to cold, pressure, and the plan of Valsalva, the operation should be no longer deferred.*

An interesting and instructive case has very recently occurred in the hospital of the 92d regiment in Edinburgh Castle, in which the external illiac has been tied by Mr. Hicks, the surgeon of that corps, assisted by Dr. Thomson and Mr. Mackesy. It adds one more to the instances of this splendid triumph of British surgery, which the French operators even to this hour can scarcely credit. But it is rendered, if possible, still more interesting, by the circumstance, that, after the artery was secured, although gangrene supervened in the limb, a successful amputation perfected the cure. The heads of the case are briefly as follows:—

CASE XXXI.

Where the External Iliac Artery was tied.

“William Bisset, a man whose constitution had been much injured by mercury, was admitted into the hospital on the 1st of December, 1816, with an extensive, irritable, and sloughing bubo in the groin. On the 26th of the month, the external pudic artery, which was involved in the ulceration, burst and discharged about a pint of blood, which was restrained by pressure; a second hemorrhage took place next day, and the ulceration

* See note at page 151, on Valsalva's plan in the *Clinique Chirurgicale* of Pelletan, tom. i., much valuable information on the subject will be found.

spread still farther. On the 31st, the blood sprung from the artery in a full jet, when the actual cautery and pressure restrained it. On the 12th of January, the hemorrhage again returned, and was controlled by pressure. It continued to recur so often from this period, that the life of the patient was in imminent danger, until, on the 22d, a dreadful discharge of blood threatened at once to terminate his existence. Constant pressure was now applied, and, next day, on consultation, the parts were accurately examined, when, on removing the clots, it was found that the femoral artery itself had given way. No other resource now remained but tying the external iliac, which was accordingly done as follows: An incision was made, between three and four inches in length, through the integuments, in the direction of the artery, beginning at Poupart's ligament, and carrying it upwards. The lower edge of the internal oblique and transverse muscles being divided, the artery was exposed, which being, with some difficulty, separated from the surrounding parts, and from the vein, a blunt curved needle was passed under it, a single ligature applied, and the edges of the wound brought together. On the 24th the limb felt cold, and was insensible, except when firmly pressed upon. On the 25th, the skin about the knee became discoloured, and a copious sanious discharge took place from the wound. On the 26th, the discoloration extended, a vesicle formed about the centre of the thigh, and a considerable quantity of coagula and sanies was removed from the groin. On the 31st, the leg was extensively mortified. On the 1st February, tension and pain of the abdomen came on, which was relieved by a dose of castor oil. On the 2d, separation in various parts of the thigh began to establish itself. On the 9th, amputation was performed at a point close up to the trochanter: every thing went on well afterwards, and the man perfectly recovered."*

The cases of hemorrhage produced by excess of various kinds are numerous and striking; and in none more obvious than where there has been unrestrained indulgence with the fair sex. One case has come within my knowledge, in a wound of the chest, where fatal hemorrhage from the lungs took place from this cause; and one, where an officer died of uncontrollable bleeding from an amputated arm, brought on by the same. A young officer, a patient of my own, with an amputated thigh, which was healed within half an inch, had seven weeks after the amputation, an hemorrhage so violent from an excess of this nature, and a subsequent opening up of the stump to such an extent, as detained him under cure for three months longer.†

* This case has also been noticed in an Inaugural Dissertation, by Dr. Tod, surgeon, 52d regiment, entitled, *De Femoris Amputatione in Cavitate Cotyloidea*, Edinburgh, 1817.

† The examples of "Mors in Coitu" are very numerous among the collectors

The older surgeons, abounding as their works do with absurdities, lay down some judicious rules for the management of the diet and the passions of their patients. Abstinence is frequently enjoined by them, and no doubt much of the success of their charms, and of their sympathetic ointments and powders, depended upon the due observance of these rules. Paracelsus was most particular in this point. Wherever the inflicting weapon was greased with his ointment, great caution was to be observed. "Quo dic quis inungit telum," says Crollius, describing the rules to be observed on this occasion, "abstineat a venere!"

Hemorrhage from blows on the face of stumps are very frequent; and many officers, who have boasted of an early cure, are in a worse situation at the end of three months, from exposing themselves to accidents, than those who have been confined to their chambers for the whole period. The great vascularity observable about the ends of stumps which have been injected after death, will sufficiently account for this; and the inexpertness in the use of crutches, and the want of balance and support, which the removal of the principal part of an extremity occasions, will naturally produce numerous accidents. In these distressing cases, rest, moderation in diet, acidulated drinks, and the local application of cold, are the most useful remedies.

One more species of hemorrhage, but fortunately not a very frequent one, is produced by the secondary opening of an arterial branch in the parts concerned in compound fractures. No defined period can be assigned to the accident, nor is there any peculiarity in the mode of cure. I have already given a case of this nature, in which no cause could be assigned; in some instances, it is occasioned by spicula of bone opening the vessel.

In addition to the direct injuries to the blood vessels now mentioned, it very frequently happens that the veins of a wounded limb become extremely turgid, and at length completely knotted and varicose; this varicose state is generally observable between the wound and the part of the limb most distant from the heart, but in some cases I have observed that it has spread still farther, and involved the whole limb. The following is a case of this kind:—

CASE XXXII.

Varicose Veins after a Gunshot Wound.

An officer, Lieut. Col. H. received a wound from a musket ball at Bergen-op-Zoom, on the night of the 8th March, 1814;

of cases. Donatus has recorded several, lib. iv. chap. xvii. p. 394. Morgagni gives some observations on the subject, extremely well worth perusing, in his 26th Epistle, where the immediate cause has been the rupture of a blood vessel. Some celebrated military men, among them Attila, have been carried off thus.

the ball entered the right leg externally at about three inches below the head of the tibia, and passed through somewhat higher up on the inside, going between the bones, and partially fracturing the fibula. I saw him in June, 1818; the wound was then perfectly cicatrized, but from the roots of the toes up to the crest of the ilium, the limb was completely varicose. In the intervals of the knotted veins the teguments were of a doughy feel, and pale œdematosus colour, and the leg, and particularly the knee-joint, were very much debilitated, and very painful, especially on a change of weather; but particularly whenever there was frost or snow; or that the season was at all approaching to cold.

This sensibility to cold is very frequent after gunshot injuries, and I am not aware of any remedy so useful for it and the varicose state of the vessels, as the laced stocking, or a bandage of calico or flannel, as the state of the weather may require, together with friction either simple or medicated, and the use of the local shower bath, cold or warm, of fresh or sea water, according to the circumstances of the patient, and the degree of relief he obtains from these applications. The effects produced by a difference of a few degrees in the heat of the water, is often much more remarkable than we could have imagined *a priori*, and the feelings of the patient should always regulate our practice with regard to its temperature. I have seen many cases relieved by the cold shower-bath, while severe rheumatism has succeeded its employment in others, and some patients have been, or supposed they have been, relieved by sea water, while the fresh has had no effect, and *vice versa*.

CHAPTER XI.

THE mechanical injuries of the nerves are entirely beyond the power of art to relieve effectually; but they are objects of great curiosity, and illustrative of many most important symptoms that occur in the course of practice. Complete divisions of a principal nerve are instantaneously followed by a total loss of motion and sense in the parts supplied by it. In partial lesions, the privation is not so complete. A secondary paralysis

very frequently takes place without any immediate injury of the nerve, as in those cases where a ball has passed so close to a large one, or the plexus from which it proceeds, as to occasion an inflammation and consequent thickening of the neurilema or investing membrane; or where, in a more distant transit of the ball, the tube formed by its passage swells to an extent sufficient to press on the nerve or plexus.

In some cases, the loss of motion and sensation on the injury of a nerve, either by a direct or partial division, does not take place to an equal extent in all the parts between the injury and the extreme points of the limb. I have seen several cases where the nerves have been injured in their passage down the humerus, and the extremities of the fingers alone suffered, all the intermediate parts possessing their full powers; and others, where pressure on the crural nerve, close to its exit from the body, has affected one or two of the toes only. This can perhaps never be explained, until we can ascertain what particular nervous chords, or fasciculi of chords, go to particular parts and organs.

A very common and most distressing set of sensations are the shooting pains and sympathetic feelings, referred by the patient to the fingers or toes of an amputated limb, which in some persons exist for months, or even years after the operation. In some, cold or damp weather, lightning, or an electric state of the atmosphere, or an easterly wind, will produce it; in others, mental agitation, violent bodily exertion, intense thought, or excesses, particularly in venery, are sure to bring it on. In some instances it can be traced to no obvious source; in others it very clearly depends upon mechanical irritation. The following case is well worthy of notice.—

CASE XXXIII.

A general officer, of distinguished gallantry, was struck by a round shot during a very desperately fought action, which buffing along his breast in an oblique direction, destroyed the arm, and left only the head of the bone and a very small portion of the shaft remaining. He was carried to an adjoining hovel, where the common amputation was performed under very unfavourable circumstances; the night was coming on, the supply of candles was scanty, and the enemy's shot were flying in all directions. The general was placed under my care on the day after the operation. The variety of cross accidents from fever and extensive sloughing, it is not within my purpose at present to enlarge upon, but the first attempt at clearing the ligatures, and making gentle pressure on them, was attended with pain so excruciating, as to leave no doubt that each included a nerve, or

was in a certain degree connected with some large nervous filaments. This agonizing sensation was not felt except the ligatures were pulled at, and then not in the stump itself, but was referred to the finger, thumb, wrist, elbow, or even to the external skin of the lost arm, as one or other ligature might be handled. I have sometimes been led to think, that the general uniformly felt the same sensations when the same ligature was touched, as I generally made my attempts to extricate them in a regulated succession, and his complaints were often of the same succession of parts. More attentive observation, however, convinced me that this was not the case; for if any one was pulled with more steadiness than another, he complained of all the parts, suffering pain simultaneously. One small ligature, if pulled in an oblique direction *inwards* towards the axilla, always gave him imaginary pain about the elbow or in the skin; but if the same was pulled strongly and directly *downwards*, the fingers were complained of. He has, frequently after the smarting of dressing was over, with great accuracy pointed out on my arm the course of the internal cutaneous nerve, as the site of his ideal pain; often he has described that of the external; and, on one occasion, I, with utter astonishment, had the general neurology of my arm and fingers traced by him. But unless the ligatures were pulled at, he had no other uneasy sensations than those which usually occur in persons whose limbs have been amputated. Once only did I ever know him refer his pain to the seat of the sensorium itself. On that occasion, from using an artery forceps to the ligatures, on which the slide moved rather stiffly, I exerted a greater force than I had intended. He convulsively put his hand to his head, expressed a sense of exquisite pain in his brain, involuntary tears dropped from his eyes, a paralytic contraction momentarily affected his mouth, a universal paleness spread over the uncovered parts of his body; and, although unusually tolerant of pain, and of a most remarkable equanimity of temper, he uttered a piercing cry, and exclaimed, "that the agony in his head and neck was insufferable." The state of collapse was so great, that I was obliged to send an aid-de-camp instantly for volatile alkali, and a glass of Madeira, by which he was soon relieved; but the painful sensation, and the prostration of his strength, continued through the day. A British admiral was present on this and various other occasions, and observed to me, after I had confessed my inability to explain, even to my own satisfaction, the cause of all these sensations, "that he never saw the general dressed without applying mentally to the wonderful sympathy manifested on those occasions, the expression of Pope: 'it lives along the line.' " I believe we must be content with the fact, without seeking for the explanation.

To account for the mode of action of the nerves, or the connexion between mind and body, will perhaps never be permitted us in our present state of existence; and we, who, to use the language of the Swedish philosopher,* "have calculated the laws of motion for distant worlds," are in profound darkness on important points connected with our own. There is no doubt, however, that the principle of perception exists in full integrity in the cerebral mass, even after these "internunciate chords" are divided. The investigation of this most curious subject belongs to the physiologist; unfortunately, the little purpose to which it has hitherto been pursued is but too obvious. It remains for me to say, that, after various gentle attempts at cutting, pulling, twisting, and a graduated and constant strain by means of appending small weights, or tying the separated threads of the ligatures over little quills of plaster, and similar contrivances, fully a year elapsed before the last ligature was removed by my friend, Dr. Irwin, deputy inspector of hospitals. The general's health did not suffer; and the unanimous opinion of the best informed surgeons was, to try no violent measures or extensive incisions, but trust to constant gentle means and the slow operations of nature.† An experiment of placing a ligature on the axillary plexus, or on any single nerve in the dead subject, will show what an obstinate resistance is offered after the protrusion of the medullary substance, by the subsequent puckering of the tough investing membrane, which during life will not admit of the ligature sliding off, either until the part is absorbed in course of time, or the materials of which the ligature is composed undergo some decomposition.

Although examinations after death, or after the removal of a limb, by showing the site of balls, splinters, ligatures, &c., will often very satisfactorily explain the source of many nervous symptoms, yet we are frequently left altogether in the dark.

In the very interesting case given us by Dr. Denmark in the Medico-Chirurgical Transactions, vol. iv., the source of the patient's torture, which approached to *tic doloreux*, was satisfactorily traced to the imbedding of a portion of a leaden ball into the posterior part of the radial nerve; but although a lesion of

* *View of the Progress and Present State of Animal Chemistry*, by J. J. Berzelius. Translated from the Swedish by Gustavus Brunnmark. London, 1813.

† Mr. Bingham, hospital assistant, assisted me in dressing the general daily. He was also occasionally seen by Mr. Guthrie, Mr. Gunning, surgeon-in-chief, and by Drs. Thomson and Somerville. Mr. Brownrigg suggested some ingenious modes of removing the ligature.

Portal; *Cours D'Anatomie Medicale*, vol. iv. p. 290, may be advantageously consulted on this curious subject; and also Lamorier; in the *Mem. de l'Acad. de Montpellier*, anno 1737. See also the *Acta Medica Berolin.* Dcc. 2, vol. viii

this nature was suspected previous to amputation, and indeed almost demonstrated by the symptoms and sight of the wound, yet, on mature reflection, amputation was preferred to any partial excision of the nerve. I apprehend, if we consider the great extent to which the thickened and diseased state of the investing membrane of the nerves may reach; the certainty of greatly lessening, and perhaps eventually destroying the motion and sensibility of the parts to which they are distributed, by cutting off the communication with the sensorium; the contracted or distorted state in which the limb generally is, and the possibility of exciting universal and highly dangerous commotion of the system; we will rather prefer the almost certain effects of amputation, where any operation is required, to the more brilliant but ambiguous promises held out by a dexterous dissection.

Surgery has little positive aid to give in cases of wounded nerves, and even of the phenomena attending them our knowledge is limited. In the living subject, according to Prochaska, a divided nerve retracts, and the medulla is expelled from its extremities, but more copiously from the upper than the lower end. In many cases, however, particularly in the axilla, the nerves protrude considerably, so as to require removal in cases of high amputation. The ends of divided nerves are united by a new-formed matter; but it has been disputed whether this was real medullary matter or not. Dr Haighton, in the Philosophical Transactions for 1795, proves that this new matter will perform the functions of a nerve, and this appears to me conclusive upon the point. These functions are, however, restored but very slowly, and not by any means uniformly. Nor does the assertion of Cuvier, that the power of motion is restored upon the reunion, but the sensation lost, universally hold good.

With regard to the reunion of divided nerves, it has been asserted by Professor Meyer (Bibliotheque Germanique, vol. ii.,) that the reproduction of nervous matter is more rapid in the tibial than in the ulnar nerve, and that in the sciatic the reunion is the most difficult of all. This may have happened in the professor's experiments on animals, but I cannot say that the fact has ever struck me in my examination of military men, who have been invalidated in consequence of their wounds.

The total division of a partially wounded nerve is the only operation recognised by modern surgeons. The experiment is, however, hazardous and uncertain, and I have principally confined myself to venesection, with emollients to the parts, which I have employed with advantage where the accident was suspected.

Œdema is a very frequent consequence of gunshot injuries

of the extremities, and is generally complicated with pressure of the lymphatics, or injury to the nerves, either immediately, or from the tumefaction of the parts from inflammation. By the use of gentle friction, with moderately stimulant embrocations, succeeded by the local shower bath, and the subsequent application of a firm flannel roller, this troublesome symptom will be in general benefited after some time. I have also derived essential relief from the distressing numbness of the fingers in such cases, by the frequent evaporation of sulphuric ether upon the part. I have never noticed injuries of the lymphatic vessels themselves, unconnected with general affections of the limb.

To the authorities already referred to in this chapter, I would add Mr. Guthrie's excellent and practical chapter on gunshot wounds, accompanied with lesion of the large nerves, in his third edition. In the course of the present work, while treating on wounds of particular parts, I shall incidentally notice various affections consequent upon injuries to, or pressure on the nerves.

CHAPTER XII.

OF SOME GENERAL AFFECTIONS OF THE SYSTEM FROM WOUNDS.

THE prevention of fever, or the lowering of its violence when formed, is an object of most serious importance in the medical treatment of wounds; and without strict attention to the constitutional symptoms of our patient, the best operation, and the most judicious local treatment afterwards, are of no avail. In the preceding observations, I have with this view touched upon the necessity of carefully investigating the state of the bowels and the skin, and regulating the diet of the wounded, their personal cleanliness, and that of the hospitals in which they are placed. It does not come within the limits I have prescribed to myself, to enter at large into the detail of the various species of fever which appear in military hospitals, or supervene upon wounds. I shall, however, make a few observations on some points that appear to me of considerable importance to be attended to by the less experienced practitioner.

The inflammatory symptomatic fever, which succeeds to wounds and operations, is by no means uniform in its period of attack, nor does it run through its course in conformity to any known or established laws. Its invasion, which is most generally influenced by the violence of the injury, the irritability of the patient, or the importance of the injured parts, is sometimes remarkably retarded, so as to give rise to very fallacious hopes; and whether it is, that this violence is only suspended to acquire additional force, or that its late appearance throws both patient and surgeon off their guard in the very important point of diet, it so happens, that those cases are generally the most ambiguous in their results.

Neither is the quickness of pulse, nor the heat of skin, infallibly indicative of the presence of fever, or of its probable termination; and therefore it is, that the state of the tongue, stomach and stools, and of the senses, should be most particularly attended to. Sobriety is so rare a virtue among soldiers, that many alienations of mind are attributed to drunkenness, which, in reality, are the consequences of fever; and the deception is the more complete, that the look and general appearance often combine with the state of the senses, to deceive the incautious and superficial observer. But though he may be misled as to the presence of intoxication, he can never do wrong if he treats the case as if that state actually existed; for it should never be lost sight of in practice in military hospitals, that there prevails an almost universal propensity to excess, both in drinking and food, which is increased by the military theory that refers all disease to weakness, and is countenanced and assisted by the attendants, who are of the same class of society, and imbued with the same prejudices as the patients. The principal remedy, then, in the cure of this fever, will naturally suggest itself; this is, purging; and the grand preventive is abstinence. In the administration of the remedy, no difficulties will be thrown in the way of the prescriber; but he is constantly assailed by solicitations to relax the rigour of diet; and it requires a very strong conviction of its necessity, and no small share of self-command, to resist. The character of a young man stands high with the soldiers in proportion to the extent of extras on his diet-roll, but the success of his practice is *invariably in an inverse ratio*. Where, however, indulgences may be conceded with safety or advantage, his humanity will be best exerted in witnessing the administration of the articles he orders; for too often they are commuted for spirituous liquors, for the mutual participation of patient and nurse.

In the symptomatic inflammatory fever from wounds of the head, thorax, and abdomen, our grand dependence is upon general blood-letting; but it is not often necessary in wounds of

the extremities, without evident topical congestion in the more vital parts. The use of local blood-letting by leeches is, however, of great importance, as is also the topical application of cold; although insuperable objections, from the immobility of the patient, often exist to the employment of the general affusion.

If the fever is obviously kept up, as in compound fractures, by great local irritation, our only resource is opium; and, however theory may condemn it, or practice sanction the condemnation in idiopathic fevers, we have no better remedy in those now under consideration; but it should invariably be administered by the prescribing officer himself, or under his observation.

There is a circumstance well worth attending to in the administration of opiates, viz. their effects on the bowels, skin, and urine. The well known constipation they induce, must be guarded against by proper remedies; but an effect of the sympathy which exists between the skin and kidneys, and which produces an increased flow of perspiration, together with the secretion of a very great quantity of animal mucilage and lithic acid, on the use of opiates, is not to be confounded with the state of the skin and urinary depositions resulting from fever.*

The camphor mixture, with a sufficient quantity of the extract of *hyoscyamus*, forms an anodyne of high utility in those cases where opiates are necessary, I have used it principally in private practice, and since the conclusion of the war of 1815; the quality of the *hyoscyamus* formerly supplied to the army, not allowing so many opportunities of applying that remedy as I have since enjoyed.

The hectic form of symptomatic fever, of which so much has been written, and for which we have no positive preventive or remedy in medicine, is as irregular in its periods of attack, in its violence, and in its duration, as the inflammatory symptomatic fever which generally precedes it. Hectic seldom, if ever, comes on without the existence of suppuration, and yet the speedy establishment of a healthy suppuration is one of the most promising preventives to its appearance. All states and stages of wounds are subject to hectic, but I am not aware of any in which it can be predicted to a certainty, although the weakly, and those who complain much of pulmonary and of rheumatic affection, or constant ingurgitators of ardent spirits, have been the general subjects in my practice. Where the diseased part admits of removal, it is the only cure; and on the proper period I shall offer some observations when I treat of amputation. Where it does not, the whole treatment may be

* For a full view of the symptomatic and hectic fevers, see Thomson's Lectures on Inflammation, pp. 102 and 323.

summed up in the words of the venerable Heberden. "The principal, if not the sole attention of the physician, must be employed in relieving symptoms." Here, again, restrictions in diet are of the most vital importance, and the access to wine or spirits is *poisonous*. The medicines to be employed must entirely depend upon the particular circumstances of the case. Opium is extremely useful, and with some, bark is held of considerable importance.

On the mode of administering bark, and even on its necessity or utility, a great diversity of opinion prevails at the present day. For my own part, I have given it what I conceive to be very fair trials; and although I would not reject it altogether, I must confess its powers appear to me by no means to justify the reputation it once possessed. That it has been abused, not only in the quantity and mode of its exhibition, but in the cases in which it has been employed, admits of no doubt; upon the whole, from the result of many trials, I am led to prefer aromatic bitters, with occasional alkalies, to any form in which the bark can be used in general hospital practice. As an external application, I am now convinced it is at best inert; and it has the very serious inconvenience of disguising the appearance of wounds, and detracting much from their cleanliness.* The discovery of the sulphate of quinine, may doubtless obviate some of the objections to the bark, not the least of which was, its bulk, and the large quantity of inert matter swallowed in each dose. The portability of this preparation fits it pre-eminently for military practice.

As a British soldier confessedly exceeds those of all other nations in excellence and completeness of clothing, in regularity of the supply of food, and in external parade cleanliness, so is a British barrack or hospital, while under proper control, and a correct system of internal management, pre-eminently distinguished above all others. But while we bestow this praise, so justly due to our own troops, let us not withhold from others that justice which is due to them. In the armies of other nations, drawn from southern Europe, sobriety is a leading virtue. Cleanliness, although not very striking in their exterior appearance, is much more generally attended to by frequent bathing than among our own soldiers; their periods of rest and exertion, too, are more regulated than with us; their minds are more cheerful, and they are more inclined to social converse; while their communication with the other sex is rather a sentiment, than an ebullition of brutal passion. These are points so

* When it may be thought necessary to employ bark, the judicious observations of Dr. Balfour should be attended to. See the General Preface to his Collection of Treatises on Sol-lunar Influence. 8vo. Cupar, 1811.

striking, as to be obvious to the most inexperienced eye, even on a cursory glance: but to bring it more fully into view, and to trace the effects of the difference where they become most obvious and most essential to the soldier's welfare, it is only necessary to look at a British and a foreign soldier arriving wounded from the field of battle at the gates of a hospital. The demeanour of the latter is such as would almost lead to the opinion that he was equally drilled to the tactics of the hospital as the field. In our own soldiers, their energy in action is seemingly unaccompanied by any prospective view of what may happen them afterwards. They too often come either furious or stupid from intoxication, totally bereft of their necessaries, or with such masses of rags, as serve only for fomites of contagion, and often with a female attendant whose appearance and behaviour are more those of an infuriated bacchanal than a nurse. The humanity of our government admits of a certain number of women per company to embark with troops proceeding on service; and hence, perhaps, this part of the evil is not to be remedied; but to prevent, as much as human foresight can do, the generation and introduction of fever into a new-formed hospital, no individual of either sex should be admitted, without a rigorous examination and purification of their persons and their baggage.

In the establishments where proper stores have not been provided for the knapsacks or "kits," as they are technically called, of the soldiers, they but too often form the pillow of a wounded man, and, perhaps, from a defect of bedding, it may so happen that the blanket, in which he himself, his wife, or his child have slept, or been sheltered under for the course of a campaign, becomes a part of his covering in the wards. Where this evil is inevitable, a minute inspection of these articles becomes an imperious duty; the heterogeneous mass contained in the knapsack of a soldier, particularly if a married man, is often extremely offensive; no ceremony, therefore, should be used in removing every thing from his immediate possession, except his actual necessaries; and whenever his blanket, or ordinary clothing, can be subjected to immersion in boiling water and subsequent baking, it should never be omitted. The visiting surgeon should not be contented with the ordinary parade cleanliness of a smooth chin, and clean hands, but should look especially to the body and lower extremities. To persons accustomed to the decencies of civil life, it is inconceivable what a varnish of filth is sometimes observable on the legs and feet of soldiers, not only disgusting to the view, but demonstratively obstructive to the due course of exhalation from the skin, and beyond every doubt a most fertile source of fever of the worst description.

The antipathy to a free admission of air, and the predilection for crowding into corners and huddling up their bedding, are also very common among soldiers, whether in health or under the pressure of disease. A graduated temperature, and the regulated admission of air into clinical wards, is the established practice in all well-regulated hospitals; but in the surgical wards, especially after an action, and with numerous compound fractures, and other profusely suppurating injuries, nothing short of a full, free, and uniform current of air throughout the whole can prevent infectious fever. In fact, a ward which barely presents covering from the inclemency of the weather, and shelter from the direct stream of air upon the bed of the patient. The temperature of this air may be regulated by fires, and individual cases may be accommodated with an additional supply of blankets; but the true process of disinfecting a ward, or preventing its ever being subjected to contagion, is to provide for a constant renewal of its atmosphere. Occasional ventilation will but partially remedy the evil, for the tenacity with which the effluvia of animal bodies adhere to the substances exposed to them is very remarkable. The late illustrious philanthropist, Howard, gives us a most striking proof of this, in his observations on the air of prisons. "My reader," says he, "will judge of its malignity, when I assure him, that my clothes were, in my first journeys, so offensive, that in a post-chaise I could not bear the windows drawn up; and was, therefore, obliged to travel on horseback. The leaves of my memorandum book were often so tainted, that I could not use it till after spreading it an hour or two before the fire: and even my antidote, a vial of vinegar, has, after using it in a few prisons, become intolerably disagreeable."—"Dr. Hales," he adds in a note, "Sir John Pringle, and others, have observed, that air, corrupted and putrified, is of such a subtle and powerful nature, as to rot and dissolve heart of oak; and that the walls of buildings have been impregnated with the poisonous matter for years together."* Some of the villages in Portugal, which had been occupied as hospitals during the peninsular campaigns, became so saturated with contagion, that a few hours' residence insured to many a paroxysm of headache or fever, if a copious bilious vomiting or diarrhoea did not prevent its accession.

The inefficiency of unassisted fumigations is now pretty generally acknowledged by their most sanguine admirers; where I have lately employed them, it has been more from a compliance with custom, than from any conviction of their utility. That some of them correct the fetor of the discharges from suppurating surfaces, is well known, and in such cases they have

* The state of the Prisons in England and Wales, by John Howard, F. R. S. Warrington, 1777, 4to. p. 13. See also Brocklesby, p. 62.

their merits; and if they cheer the spirits of the wounded, or tend to promote the circulation of air, they are not to be entirely rejected; but where they, in the slightest degree, interfere with thorough ventilation, or cleanliness, they must be hurtful. The matter of contagion is constantly emanating from the surface, and, perhaps, from the lungs of the diseased, and is enveloped by, and retained in, their bedding. Admitting that, by fumigation, we can destroy or neutralize the matter that is formed, we cannot prevent the formation of more; but by the constant access of pure and fresh air, we can dilute it so as to render it innocuous, and this from the moment of its being evolved from the bodies of the sick, and when it cannot have become concentrated, or have produced any effect on others.

An experiment, on a very large scale, was tried at Torgau, under the superintendence of Dr. Graefe, surgeon-general of the Prussian army, to determine the efficacy of fumigation.* Three nearly similar wards were selected, each containing forty beds; No. 1 was fumigated with muriatic acid; No. 2 with oxymuriatic acid; and No. 3 with nitric acid. The fumigation was repeated every two hours, with the proper precautions of closed windows and doors, so as to keep up a constant smell of the acids, but not to such an extent as to excite coughing in healthy lungs, and the experiment was continued for six weeks with every precaution, and with the utmost minuteness in ascertaining and detailing the facts. The results were, that in ward No. 1, two of the attendants were infected, and six patients died. In No. 2, one of the attendants was infected; and in No. 3, three were infected, and among them a young man, who, "ex officio," fumigated the wards, and respired scarcely any other than a medicated atmosphere.

On a late occasion, when I was employed in superintending the conversion of a fever hospital at Glasgow into a temporary barrack for troops, Dr. Balmanno, one of the physicians to the establishment, was so good as to point out to me a small square, where, in consequence of the immediate vicinity of a private manufactory, from which powerfully acid fumes were most copiously evolved, the inhabitants constantly breathed a strongly impregnated atmosphere, and yet there were few spots in Glasgow where the typhus epidemic, which so lately existed in that city, was more prevalent; so strong was the acid impregnation of the atmosphere that I could not approach without coughing, and yet I understood it was then comparatively very moderate to what it usually was.† The substances which are prepared

* See Richter's *Medizinische Geschichte der Belagerung und Einnahme der Festung Torgau, und Beschreibung der Epidemie, welche daselbst in den Jahren 1813 und 1814 herrschte.* Berlin, 1814.

† See Sir James Fellowes' *Reports on the Pestilential Disorders of And-*

there, are the oxymuriate of lime for the use of bleachers, sulphuric acid, soap and soda. The substances principally employed there are rock salt, lime, nitre, rosin, tallow and palm oil. The gas *chiefly* evolved is the oxymuriatic, or chlorine; but there are also muriatic, sulphureous, and, probably, a small portion of nitric; for this information I am indebted to Dr. Balmanno and Mr. Ray, staff-surgeon.

Where pulmonic complaints exist, these acid fumigations are inadmissible in the occupied wards. I believe, upon the whole, they will be found to answer best in rooms that have been evacuated by the patients, and where the absence of the acid smell can be made a test of the renewal of the air in a certain time after the fumigation has been effected; or in cases where the bedding or clothing of the sick are to be exposed to medicated vapours for the destruction of foul smells, or vermin, previous to their being immersed in water, and subjected to the operations of boiling or washing.

The discovery of the supposed powers of the acids in destroying contagion has been much disputed: the real history of the point, I believe to be, that, so early as 1750, Sir John Pringle, one of the greatest army physicians which this country ever produced, knew the power, or supposed power, of the acids. Johnstone published an account of the muriatic acid gas (which he had used at Manchester in 1752) in 1758. Morveau, in 1773, made use of the muriatic acid gas at Dijon. Smyth used the nitrous gas in 1780 at Winchester. Neither Pringle, Johnstone, Morveau, nor Dr. Lind, (who also was acquainted with the supposed power of the acids,) tried them in rooms *inhabited by the sick*, or, if they did, their trials were not generally known; that seems to have been first done by means of the nitrous acid, and the accounts widely circulated by Dr. Carmichael Smyth in 1780.

Among the numerous proofs that we have of the efficacy of pure air on the sick, none is more interesting than that given by the most scientific traveller of this or any other day, Humboldt, in his Personal Narrative. "A sailor," says he, "who was near expiring, recovered his health from a circumstance that is worthy of being mentioned: his hammock was so slung, that there was not ten inches between his face and the deck. It was impossible to administer the sacrament in this situation, for, agreeable to the custom on board of Spanish vessels, the viaticum ought to be carried by the light of tapers, and followed by the whole crew. The patient was removed into an airy place, near the hatchway, where a small square birth had been formed

with sail-cloth; here he was to remain till he died, which was an event expected every moment; but passing from an air extremely heated, stagnant, and filled with miasma, into fresher and purer air, which was renewed every instant, he gradually revived from his lethargic state, and his recovery dated from the day when he quitted the middle deck."

The constant and uniform renewal of the air is an object of prime importance at all times; but it is at night that it is more particularly required in the wards of a hospital. The eye of the superintending officer can, during the day, always detect the more obvious filth; but at night the excrementitious discharges of the patients are allowed to accumulate; the beds of the ward are occupied by many patients, who, during the day, were kept for a time in the open air; lamps and candles increase the consumption of the vital part of the atmosphere, and it is highly probable that the natural nightly exacerbations of disease tend to eliminate from the bodies of the patients, exhalations which still more powerfully contribute to vitiate it.

I may perhaps, be permitted to adduce my own case, in farther illustration of a subject, which can never be enough impressed on the army-surgeon. While the British army was encamped upon the heights of Sobral, covering the approach to Lisbon, and watching the movements of the French under Marshal Massena, in 1810, it became a matter of necessity to have the whole in a state of preparation for movement at the shortest notice. Our baggage, therefore, was always ready packed at night, and we remained ready to turn out at a moment's warning. I procured what I conceived to be a very ingenious contrivance as a substitute for a bed; I had a new blanket sewed up in the form of a sack, with a running string at its mouth; into this I got at night, and, tying it round my neck, slept very comfortably on a piece of water-proof sail-cloth. The tents under which we lay were not of British manufacture, but a very thin flimsy canvass, pervious to every blast. I continued in perfect health until the retreat of the French permitted us to get under cover of some half-burned villages. After some days spent in marching, I got into a house, and fixed my bed in a room with thirteen other officers, where we were perfectly secured from the inclemency of the weather. My birth was considered as particularly enviable, being in a very dry sheltered corner; I still used my blanket sack, but the violence of the rains prevented the possibility of exposing it to the air. On the third day I was attacked by irregular chills and febrile heat, and before the 10th my life was in imminent danger from a combination of typhus and dysentery, and nothing but immediate removal to Lisbon preserved it. Three persons, who, in succession, used my blanket, and got into a *snug corner*, were attacked in the same manner, while

all those who slept under the windows, or in the more exposed parts of the building, escaped all febrile affection whatever.

To filth, irregularities of diet, whether in quality or quantity, intoxication, crowding together and respiring a foul air, as sources of fever, is also to be added, a fact well known to all conversant with the diseases of armies, viz. the much greater susceptibility of contagion after the active part of a campaign is terminated, than while both body and mind are fully employed; a combination of all which causes often superadds to the horrors of war, a scourge much greater than the sword itself.*

From a consideration of the vast mass of evidence upon some of the points now alluded to, a very ready explanation is afforded of the peculiarities observed by the older surgeons among their hospital cases, and in the events of their various surgical operations. At some hospitals, one set of operations failed; another had its peculiar fatalities, each proportioned, no doubt, to the number of cases of any prevalent disease for the treatment of which the hospital surgeons were celebrated, or the districts remarkable; while, in the larger establishments, dedicated to the promiscuous reception of all cases, every operation, however trifling, was attended with unsuccessful results. Atmospheric influence, and all the absurdities of astrology, were called in by our fathers to explain this simultaneous deterioration of their patients, and various and discordant states of the air were charged with the ill effects, which proceeded in a great measure from a want of its free diffusion. Nor do the results of our hospital operations in modern practice bear any proportion to the success of those in private life, although in each we attribute a fair share in the consequences to the climate, the season, and the nature of the prevalent diseases, as well as to the constitution of the individual.

I would refer my readers to the admirable Memoirs of Tenon for many points connected with hospitals, but especially for some interesting observations on the fatal effects of operations in establishments where there is a communication between the fever wards and those appropriated for the wounded and other surgical patients. It was found that gangrene attacked the most simple wounds, ulcers became malignant, and all external maladies took on a bad character at *La Charité*, when placed near the putrid fevers; this appeared at first only in the occupiers of the five

* M. Larrey describes this fever as it occurred in the campaign of 1803, as does Pinel, in his "Medecine Clinique." Hufeland also published an account of it at Berlin in 1814; and Masnou has given some observations connected with it in the medical history of the siege of Torgau, in Saxony, in the *Journ. de Méd.* Vol. xxxvi. It is not consistent with my plan to enlarge on it here; but I trust some of the able army physicians, who served in Spain, will favour us with their observations on it. Pringle affords an inestimable model for all works of this nature.

or six beds nearest the fever cases;—hence, as a precaution, no patients with open sores were ever placed in these beds.

On the powerful causes above alluded to, much of the peculiar appearances of wounds will depend; and in proportion as they are understood and attended to, a knowledge of the true nature of these peculiarities will be acquired, and much of our uncertainty in the discrimination of morbid phenomena avoided. Hence, the history of particular epidemics will always be interesting. Under this conviction, I shall, without entering into a general description of the various forms under which the disease has been observed by others, offer the result of my own experience in one of the greatest scourges of military hospitals, known under the various names of Hospital Gangrene, Malignant Ulcer, Putrid Ulcer, Infectious Ulcer, Sloughing Sore, &c.*

CHAPTER XIII.

OF HOSPITAL GANGRENE, AS IT APPEARED IN SOME OF THE BRITISH HOSPITAL ESTABLISHMENTS IN SPAIN, PORTUGAL, AND THE NETHERLANDS, AND OF THE ORDINARY MORTIFICATION OF GUNSHOT WOUNDS.

THE military events on the Peninsula during the month of July, 1813, in which the action of Vittoria was fought, rendered it necessary to form several hospital stations in the provinces of Alava, St. Andero, and Biscay. Among these, Bilboa was selected as capable of accommodating a large number of sick and wounded, as being easy of access, and remarkable for its salubrity.

* The following account of the gangrene at Bilboa first appeared, nearly in its present form, in the *Lond. Med. Repository* for March, 1815. An excellent summary account of the disease is given us by Professor Thomson, in his *Lectures on Inflammation*, p. 456. Professor Delpech, of Montpelier, published a still later account of hospital gangrene in 1815; and Assistant-Staff-Surgeon Blackadder published an account of that which appeared at Passages in Spain, in his “*Observations on Phagedena Gangrenosa.*” Edin. 1818. But the most interesting paper that I am acquainted with, is one by Professor Brugmans of Leyden, in the “*Annales de Literature Medicale, Etrangere et National,*” for July, 1815; edited by MM. Kluyskens and Kesteloot. The 106th and 107th numbers of that work, or the first two of the 19th volume.

The principal hospitals were distant about four miles from the town, and six from the sea. They consisted of a noble convent, which was occupied chiefly by medical cases, and of the upper floor of a very extensive building, formerly a rope-walk belonging to the Spanish government, which was exclusively allotted to the reception of surgical cases, and placed under my care.

The Cordeleria, or Rope-walk Hospital, was built on the southern bank of a small but rapid stream, the Ibaicabal, which runs through a fertile valley, gradually opening from the town of Bilboa to the Bay of Biscay. Its waters, which rise in the lofty mountains that bound Alava and Biscay, are strongly impregnated with iron, and teem with wholesome fish. The tide in the vicinity of the hospital rose between six and seven feet, and extended its influence about four miles up the stream.

The soil in the immediate vicinity of the hospital was dry and gravelly, shelving gradually from the water, until, at the distance of a mile, a lofty ridge of mountains rose behind, and perfectly screened it from the winds. These mountains, the highest of which is said to be, by barometrical observation, about 1400 feet above the level of the sea, abound in iron. On the opposite bank of the river, a chain of hills stretch along at the distance of half a mile, leaving between their base and the water a fertile and well drained flat.

Good water was scarce in the immediate vicinity of the hospital; although, with a very little arrangement on the part of the natives, a pure and never-failing stream might be brought from the neighbouring hills. This necessary article, as well as our provisions, which were wholesome and abundant, was supplied from the town by boats.

The prevailing winds, which were westerly and south-westerly, blew up the valley from the ocean, and a mild steady breeze usually prevailed. The state of the barometer, and quantity of rain which fell, were not observed for want of instruments. During the latter end of August, and the beginning of September, at which period the hospital gangrene first made its appearance, the weather was mild, and we had a few refreshing showers. The thermometer at this period ranged from 68° to 70°; but, towards the close of September, the mercury rose in the wards of the hospital to 74°, and one day as high as 78°. The nights were, however, generally, cold, cloudy, and moist.

No epidemic disease occurred among the inhabitants during our occupation of this station. They were remarkably healthy and robust, and numerous instances of longevity were to be met with among them. The topography of the Cordeleria, was not more favourable towards its selection as a hospital than the interior of the building was comfortable, and adapted to the purpose. It was 1200 feet long, by 40 broad, and 16 in height, well

plastered and floored, and raised 12 feet above the surface. A very important advantage enjoyed by this building, and one which I would strenuously recommend in all erections for hospital purposes, was, that the walls were perfectly free from cornice, pillar, or any ornamental projection whatever; neither were there presses, closets, shelves, nor recesses, all of which I consider as serving no purpose so effectually as collecting and secreting filth, while the ends for which they are generally employed can be attained much better by a proper distribution of tables and benches. In this hospital, also, we had the important benefit of several doors and windows, *extending to the floor*, with large staircases at each end of the building, and ample room for our stores, provisions, &c. Had we had bedsteads, I could not have desired a better hospital, even though curtains had not been supplied, a deficiency so feelingly lamented by Mr. Roux* in his visit to our public establishments. On the first occupation, however, there were deficiencies in many articles of comfort and convenience. The circumstances of the times extinguished all hopes of receiving effectual assistance from our allies, while the rapid movements of the army, and the distance of our stores, cut us off from the prospect of immediate supplies of our own. Our bedding, therefore, was extremely scanty; the wounded lying on straw spread upon the floors, and very much crowded together, which was one cause, no doubt, of the rapid progress of contagion. Our medicines also, and other materials, which were purchased principally from the Spaniards, independent of the great exorbitance of their price, were of the very worst description. We did not long, however, labour under these disadvantages; the talents and industry of Sir James M'Grigor, the head of the hospital staff, soon removed every cause of complaint, and our supplies became excellent and abundant.

In a hospital, situated as I have described, I found on my arrival from Vittoria, in the last week of August, 1000 wounded men; the larger number of whom had arrived in successive escorts from the same place, many in wagons and carts, but a large proportion was so slightly wounded as to be able to complete the journey (19 leagues) on foot. The remainder of our patients were brought from the lines before St. Sebastian, by sea; and these exhibited by far the most formidable cases. The sloughing sores had all been collected into a separate airy ward, on the second floor, and were reported to me as mild and yielding easily to the treatment adopted; but, as I was well aware of the insidious nature of these cases in a large hospital, full to an overflow with gunshot wounds, pouring in under all

* Narrative of a Journey to London. Translated from the French, 8vo. London, 1816.

the circumstances of the siege, or a great battle, and of the confusion consequent on such events, I was prepared for fever of the worst kind, and the most contagious nature. Under these impressions, I laboured incessantly on the police of the hospital, under the able orders and support of Dr. Charles Forbes, then head of the station; had the building separated into wards, and divisions, opened ventilators, removed nuisances both within and without, and enforced the most rigid attention to personal cleanliness, and to the frequent renewal and airing of the bedding. I had a most striking instance, within my own experience, of what attention to these points can effect in the way of prevention; for, at the general hospital at Elvas, of which I was principal medical officer during the whole period of the successful operation before Badajoz in 1812, although 2500 wounded were treated there, yet not a single instance either of hospital gangrene or typhus fever appeared among them, although both these diseases had raged with unexampled fury the two preceding years. This happy result I attributed to cleanliness and ventilation, and to the removal of an enormous dunghill, the lower stratum of which was formed of the semi-putrid tow, and bloody bandages left after the battle of Talavera; and which, on being turned up, was incrusted with the same kind of fungus mentioned by the older French surgeons, as appearing on the dressings at the Hotel Dieu.* The smell emitted, while removing this decomposing mass, was almost insupportable; and, together with the effluvia from two stagnant ponds, which I caused to be drained, threatened the safety of the whole neighbourhood.

My fears were soon verified at the Cordeleria; for in a few days the whole hospital was overrun with gangrene, which I more particularly dated from the arrival of some fresh wounded men from Vittoria, of whom about thirty were in an advanced stage of the disease, which, it was said, first appeared upon the journey down. The ward appropriated to sloughing cases at once became a horrid scene; every sore in the house assumed a malignant character; and the deaths increased in nearly a three-fold proportion.

Our knowledge of the origin of contagions is altogether extremely limited; I shall therefore offer no remarks upon the subject of that under consideration here, as I propose to confine myself solely to practical facts. These were observed at the bedside of many hundred patients; and without any reference to systematic arrangement, I shall describe them from my notes upon the subject, and as they struck me upon the spot.

* These fungi are very rapid in their growth, springing up in one night. Their species, I believe, is not determined. They were supposed to exist only on bandages moistened with oxycrate; but they are by no means confined to them.

Let us suppose that our wounded have all been going on well for several days, when suddenly one of our most promising patients complains of severe pain in his head and eyes, a particular tightness about the forehead, want of sleep, and loss of appetite, and that these feelings are accompanied with quickness of pulse and other symptoms of fever, his wound, which had been healthy and granulating, at once becomes tumid, dry, and painful, losing its florid colour, and assuming a dry and glossy coat. This is a description of the first stage of our Bilboa hospital gangrene; and if a brisk emetic was now exhibited, a surgeon, not aware of the disease that was about to form, would be astonished at the melioration of the sore, and the unusual quantity of bile and of indigested matter evacuated by vomiting. In many cases, and particularly if the ward was well ventilated and not over crowded, nothing more was done except to change the patient to another room, or, if that was not practicable, to remove his bed from the place where it stood, particularly if in a close corner of the ward, and not raised from the floor by boards and tressels, and to order him an entire change of bedding, while, at the same time, he was well washed with tepid water. If, however, this incipient stage was overlooked, the febrile symptoms very soon became aggravated; the skin around the sore assumed a higher florid colour, which shortly became darker, then blueish, and at last black, with a disposition to vesicate, while the rest of the limb betrayed a tendency to oedema. All these threatening appearances occurred within twenty-four hours; and at this period also the wound, particularly if it was situated on a muscular part of the thigh, buttock, or calf of the leg, *whatever might have been its original shape, soon assumed the circular form*. The sore now acquired hard, prominent, ragged edges, giving it a cup-like appearance, with particular points of the lip of a dirty yellow hue, while the bottom of the cavity was lined with a flabby blackish slough.

This rapid progress and the circular form of the ulcer were highly characteristic of hospital gangrene, and obtained almost universally in every wound infected with it, wherever situated. I have seen the external ear and the palpebrae destroyed in this manner, as if in a series of concentric circles. Even upon surfaces barely contiguous, as the fingers and toes, it generally spread in a similar way; so that the sore, which might have been on the middle finger or toe, and confined entirely to it at the morning dressing: by night engaged the adjoining sound ones, and in less than twelve hours more embraced the whole foot or hand. The originally affected spot was always the centre of this wide-spreading diseased circle. Over the ribs, also, or over the interdigitations of the serrati muscles, the surface of the wound preserved the circular form, although the

bottom was irregular or angular. The discharge in this second stage became dark coloured and fetid; and the pain was extremely poignant.

The gangrene still advancing, fresh sloughs were rapidly formed, the increasing cup-like cavity was filled up and overtopped by them, and the erysipelatous livor and vesication of the surrounding skin gained ground, while chains of inflamed lymphatics could be traced from the sores to the adjoining glands, there exciting inflammation and suppuration, which often furnished a new nidus for gangrene. The face of the sufferer assumed a ghastly, anxious appearance; his eyes became haggard, and deeply tinged with bile, his tongue loaded with a brown or blackish fur, his appetite entirely failed him, and his pulse was considerably sunk in strength, and proportionally accelerated. In this stage the weakness and irritability of the patient was such, that the slightest change of posture, or the most delicate examination of the sore, put him to torture, increased by his inability to steady the limb, which, if moved at all from the bed, was seized with tremors and spasmodic twitches. I have never observed this spasmodic affection increase to tetanus in any one instance of the many hundreds which I have seen; and I have been almost tempted to imagine the two diseases incompatible.* When these nervous affections came on, the bravest soldier betrayed a symptom, which, in those of less strength of mind formed a striking feature in every stage of the disease, viz. the greatest imaginable impatience of pain and depression of spirits. Men who had borne amputation without a groan, shrank at the washing of their sores, and shuddered at the sight of a dead comrade, or even on hearing the report of his death, instantly predicting their own dissolution, and sinking into sullen despair. I have never in one single instance seen this irritability wanting; and I am therefore led to suppose, that those practitioners who assert that they have seen whole muscles, nay limbs, come away without pain, must have mistaken the nature of the disease they witnessed, or have seen hospital gangrene in its chronic state, when large sloughs were separating after the febrile disease had subsided.

The third and last stage was now fast approaching. The surface of the sore was constantly covered with a bloody oozing, and, on lifting up the edge of the flabby slough, the probe was tinged with dark coloured grumous blood, with which also its track became immediately filled; repeated and copious venous bleedings now came on, which rapidly sunk the patient; the

* Mr. Guthrie, however, has seen the diseases coexistent, and venesection effected a cure. See the paper of Sir James M'Grigor on the Diseases of the Army, Medico-Chirurgical Transactions, vol. vi. p. 455.

sloughs, whether falling off spontaneously, or detached by art, were quickly succeeded by others, and discovered on their removal small thickly-studded specks of arterial blood. At length an artery sprung, which in the attempt to secure it, most probably burst under the ligature; the tourniquet or other pressure, was now applied, but in vain; for while it checked the bleeding, it accelerated the death of the limb, which became frightfully swelled and horribly fetid. Incessant retchings soon came on, and with coma, involuntary stools and hiccup, closed the scene. Often, however, the patient survived this acute state of the disease, and sunk under severe irritation, absorption of putrid matter, and extensive loss of substance, without any other symptoms than those of hectic fever, arising from other sources.

While the acute symptoms, as above described, were proceeding in one part of the hospital, the same appearances began to spread through another at a distance; for immediate contact, though highly dangerous, was by no means necessary toward the propagation of this most insidious disease. The stumps which had been nearly healed caught the morbid disposition; those where healing by the first intention was reasonably to be looked for, opened, retorted their edges, put on an erysipelatous appearance, and, at last bursting up altogether, presented a frightful cup-like excavation, edged with the true characteristic *circular lip*. The slightest scratch of the dissecting knife festered; ulcers, whether simple or constitutional, became gangrenous; wounds long healed broke up, and fell into a state of foul suppuration; nay, the skin, although perfectly sound, which had been touched with a sponge employed in washing the gangrenous sores ulcerated, and soon became itself a slough. This was often observable among the *orderlies* and *nurses*. It was not, however, a long residence in the tainted air that predisposed to the reception of the contagion, as I have seen illustrated in the case of a soldier of the royal wagon train. This poor fellow, who had just landed from England, and was under the influence of mercury, employed for a venereal complaint, died within forty-eight hours after his admission, the gangrene having seized on an open bubo in his groin, eroding the great vessels in the neighbourhood, and absolutely destroying the abdominal parieties to a large extent.

In this distressing state of our hospital, some few constitutions resisted the febrile affection altogether; some had extensive local disease, without any general affection. Those cases, however, I have principally observed to occur from the inoculated slough among the attendants, who occasionally respired a purer air than the patients; and among the assistants, whose accidental scratches were best treated by destroying the part with nitrate of silver. I have, moreover, seen among the servants

and washerwomen, the febrile symptoms without any local affection; and this was clearly traced to washing the bandages and dresses. These cases readily yielded to proper remedies, principally emetics, succeeded by moderate and steady purging.

Such were the symptoms which characterized the hospital gangrene at Bilboa; one of the most subtle and destructive poisons that ever infested a hospital, attacking equally the most robust and most debilitated, and, if unchecked by medical aid, proceeding invariably to a fatal termination. Its existence fortunately cannot be long overlooked in any situation; for, to those who have once seen it, a glance at the sore, or even the smell of the ward, will immediately discover it. It can scarcely be confounded with any other disease or any species of ulcers; it may indeed be mistaken by name (and I have seen this happen) for common gangrene, but the points of difference are very striking. It does not proceed from impaired organization of the parts, nor is it necessarily preceded by inflammation, cold, or pressure; its progress is infinitely more rapid, and, when its course is checked, separation takes place in detached specks instead of the *waving line*. It is also often attended with hemorrhage, which rarely occurs in common gangrene. The two diseases, indeed, are frequently coexistent, and I have seen numerous instances of the lower part of a limb gangrenous from pressure, while a sore highly infected with hospital gangrene has occupied the upper part. To those who have seen such cases, or have had opportunities of comparing the difference of appearances of the diseased parts in two individuals, the diagnosis can never be difficult.

The skin and cellular substance, whether loose or condensed, seemed to be the parts originally and principally affected in the disease at Bilboa. This was obvious, even in the living body, but on dissection, the disease of these parts frequently was observed to spread much farther than external appearances would at all warrant us *a priori* in concluding, as we often found a diseased track running up into the groin or axilla, and completely dissecting the muscles and great vessels. This was, indeed, sometimes obvious during life; for on the separation of the sloughs, the muscles would appear as perfectly disengaged as the most accurate knife could render them: at the same time they would, for a long period, retain their florid colour and preserve their action. In very violent cases, however, the muscles partook of the disease, and either sloughed off in successive layers, or became converted into a flabby disorganized mass.

The thoracic and abdominal viscera did not appear to suffer peculiarly while the gangrene occupied the extremities; but where the ribs or abdominal parieties have been the seat of disease, I have occasionally observed that the viscera, which corres-

ponded in situation with the external sore, took on a diseased appearance. I have seen the lungs in two cases, and the pericardium in a third, covered with gangrenous spots; and I have often observed the same appearance on the liver; but I have never traced any thing of the kind on the membranes of the brain.

The bones, in some instances, resisted the contagion for a long time, either exhibiting no morbid appearance whatever, or barely throwing off a thin scale. In other cases, however, particularly where the ribs, sternum, or cranium were denuded, they became carious throughout, and sloughed away; and the caries assumed the circular form, in strict correspondence with the shape of the soft parts. In some cases, a total absorption of the phosphate of lime took place, and the bone was converted into a cartilaginous mass; this circumstance I have met with twice, once in a diseased metacarpal bone, and once in the femur. In the former case the dissecting knife cut through the bone with as little difficulty as if it had gone through the cartilages of the ribs. The latter case was very remarkable; the patient suffered acute torture from a sloughing thigh stump, which, on an accurate examination, displayed the following appearances: A thickened cutaneous texture hung like a loose pouch around a hard projecting mass, apparently consisting of a diseased muscle; within which, corresponding to the size and situation of the bone, appeared a tough, dark, body, exquisitely sensible. It had been touched with escharotics, lay loosely, and, on removal by a forceps, had all the external appearance of a stopper of cartilage about two inches in length. On examining the spot more closely, the whole of the parts contained within the diseased skin appeared of the same nature, and the disease seemed to spread up to the trochanter. The patient had been affected only fourteen days; and for the last four days the complaint appeared stationary. An operation was resolved on, which I performed, by first taking up the femoral artery, immediately under the ligament, and then cutting as deep an inverted cone as I possibly could, I sawed off the bone immediately below the trochanter. On examining the amputated portion of the limb, the whole mass, with the exception of the skin, was found to be cartilaginous, retaining the shape of an enlarged bone, but not the smallest trace of osseous matter. The tube of thickened periosteum in which it lay, alone exhibited a few detached specks of ossification. The operation succeeded, and the patient embarked in six weeks.

The blood vessels were affected as variously as the bones. In some rare cases, I have seen the femoral and axillary arteries pulsating awfully, and apparently unaffected with disease; while all the surrounding parts were completely destroyed; but in a

vast majority of cases the blood vessels partook of the general disease in which they were imbedded. They were not only completely separated from their natural connexions, but their coats sloughed away at the immediate point of disease, while the disposition extended far beyond the apparently affected spot. Hence, our ligatures but too often failed on the main branches, and any attempt on the smaller was invariably injurious. We were here naturally induced to tie the artery considerably above the seat of the disease; and this was done once on the femoral, and twice on the axillary artery; the former burst on the third, each of the latter on the second day afterwards: these ligatures were applied, no doubt, in the height of the gangrene, when all operations are hazardous. In general, the great vessels sloughed long after the acute symptoms of the disease had abated; in severe cases, under such circumstances, we always dreaded the eleventh day of the disease.

The state of the vessels was well illustrated by the following experiment. During the performance of an amputation at the middle of the humerus, every preparation was made for the injection of the limb: immediately on its separation a pipe was fixed into the brachial artery, and a coarse tallow injection, blood warm, was slowly thrown in. The gangrenous cup which occupied the bellies of the flexor muscles, and extended down towards the wrist and the palm of the hand, was immediately filled with injection, which oozed from every point of the surface, while the main artery at once gave way.

In the treatment of the Bilboa hospital gangrene, although the ulceration might seem to claim the first notice, yet it was to the constitutional treatment that we paid particular attention. We regarded external applications, notwithstanding an obvious change of type in the accompanying fever, as merely a secondary object; and, in truth, I must confess, that I viewed them as operating more by the cleanliness and attention to the patient, which their frequent application implied, than by any intrinsic value which they possessed in themselves.

In every case of the disease on the first invasion, as well as on occasions of threatened relapse, the primæ viæ were cleansed by full emetics, followed by purgatives; and the state of the bowels and skin were carefully attended to throughout its whole progress.* On the supervention of typhoid symptoms, which,

* This was the mode of treatment I found established at the hospital, and which was continued for some time, until our want of success generally, and the abuse of stimulants in some particular instances, together with the obviously inflammatory nature of the disease, forcibly arrested the attention of Staff-surgeon Dr. Boggie, to whom the merit of introducing venesection at the Cordeleria is due. Dr. Boggie has since published a most interesting paper in the Transactions of the Medico-Chirurgical Society of Edinburgh, vol. iii., part 1, in which he treats very amply on the subject; and although we appear to differ in opi-

during the months of August and September, very early made their appearance, the cure was conducted on the same principles as guided us in the treatment of pure typhus, administering in the latter stages opium in large doses, aided by a nutritious diet, and a liberal allowance of the best wine we could procure. Bark, in decoction, was for some time much and copiously employed, but I have seen great harm done by large and injudicious doses of this drug, before full evacuations had taken place and the sloughs began to separate. I need scarcely say, that a remedy so strongly recommended as venesection had early occupied our attention; but previous to the month of October, the obviously typhoid type of the disease made us extremely averse from employing it. At that period, however, a change in the weather, from sultry to cold, and even frost (at night) took place, marked by a corresponding change in the thermometer, which, at its medium range, was 20° lower than in the preceding month. It progressively sunk during the winter to the freezing point, while severe and long-continued gales of wind, from south and south-west, accompanied with constant mists and thick fogs, prevailed. Catarrhal complaints became very prevalent, and a general inflammatory diathesis was apparent throughout the hospital; but what more than all convinced us of the change of type, and pressed on our consideration the propriety of blood-letting, was, that the spontaneous hemorrhages, which formerly sunk the patient's strength, were now accompanied with obvious relief. The greatest caution was therefore used in the administration of wine and opium; the dose of the latter, which, in some of the more severe cases, had been extended to three and four grains in twenty-four hours, was now gradually diminished to a bare anodyne at night, and the wine was changed from Port to Vin du Pays, with a diminution also of its quantity; while spirits, which had occasionally been allowed, were entirely prohibited. In short, a moderately antiphlogistic regimen was universally adopted.

A favourable case for venesection at length presented itself; the result was strikingly advantageous, and the practice became general; indeed the very patients themselves implored the use of the lancet, and from that period to March following we used no other remedy, either as a cure or preventive. If it was neglected on the appearance of an inflamed ring around a sore, attended with violent throbbing pain, and a foul bottom smeared with unhealthy pus; or if, in a suspicious stump already healed, redness, pain, tension, and bounding pulse occurred, gangrene assuredly took place, if full and early blood-letting was not em-

nion, I shall ever consider my able and humane friend with the highest consideration and esteem, and I recommend his paper to every army surgeon as a model of calm observation of facts, and philosophical deductions from them.

ployed. Much to our surprise, we never observed any of the lancet wounds assume a gangrenous appearance, although previously in almost every other instance the slightest puncture festered.

In the local treatment, a great variety of methods was pursued; an enumeration of them would embrace almost all that have been proposed by authors; with the exception of the actual cautery, which has acquired great reputation in France, both in this disease and in tetanus. There exists, however, so strong a prejudice against it, that I hesitated much to encourage its adoption in the British hospitals. Some applications, which agreed for a day or two, became either inert, or hurtful at the end of that period, and we were at length guided in their use by the effect which they seemed to produce. In general, however, the sores were covered with a large fermenting poultice; and if there was great tension and inflammation in the limb, cloths dipped in saturnine solutions were applied. The more irritable sores were dressed with lint moistened with tinct. opii, or camphor dissolved in oil, or a paste of camphor and opium; where the fetor was very great, levigated charcoal, either alone or mixed with bark, or camphor, was employed. An application, also, from which we derived some assistance, was diluted nitric or citric acid.*

The French surgeons, some of whom did duty with us, used to apply hot fomentations of walnut leaves to the sores, and then sprinkle them with powdered nitrate of silver; but I observed no better effects from this than from any other external application; and, indeed, I never observed decidedly had consequences from any, except hot burning oils and nitre, the application of which, particularly of the latter, produced the most exquisite torture, without any corresponding advantage. Whatever dressings were employed, the utmost attention was paid to the removal of all filth, by repeated washing with tepid water. The sores, during the whole time of dressing, were exposed to the fumes of nitrous acid gas, which was also constantly diffused through the wards. The walls, roof, and floors of the sloughing wards, were daily whitewashed; the same cloth or bandage was never used a second time without washing; and the sponge, or tow, (which is much preferable) employed in cleaning the sores, an operation generally performed two or three times in the twenty-four hours, was immediately destroyed, to prevent all chance of inoculation which, in a large hospital, is frequently effected in spite of the best precautions.

* Sixty drops to lbij. water was the proportion of the nitric acid. The citric was applied in the native form of lemon juice.

When our endeavours began to be attended with success, the febrile symptoms began also to abate, and small florid specks, about the fifth or seventh day, appeared to break through the black sloughs, the edges of the circle lost their retorted and tumid appearance, and the looks and spirits of the poor sufferers considerably improved. The slough soon began to loosen, and at this stage, I think, the use of powdered rhubarb externally was attended with beneficial effect, and assisted much in cleansing the sores. In some cases, however, the sloughs were amazingly tenacious, and required a strong solution of lunar caustic. A much more important object than the separation of the slough, was the removal of the patient to an airy and separate ward, as no disease was more apt to recur than this. I have seen a case in which, in spite of our utmost endeavours, the wretched patient suffered thirteen different relapses, and at last sunk under the violence of the repeated attacks. These occurred from the slightest local irritation, or error of diet, and sometimes without any apparent cause whatever, and at a period when cicatrization was rapidly going on. They also at times occurred without any increase of fever; a small livid, or red spot, covered with a glairy tenacious purulent matter, suddenly making its appearance, and, however, frequently destroyed, still continuing to increase, until at last the whole sore again assumed the sloughing state. Hemorrhage frequently occurred about the period of the separation of the sloughs; it was best restrained by pressure with a sponge, or compress, dipped in oleum terebinthinæ. When the main artery gave way, amputation, as high up as possible, was our only chance of saving life; indeed, this dreadful alternative was, in a great majority of cases, rendered indispensable, not from hemorrhage alone, but from the extensive loss of substance occasioning destruction of the joints, and from other sequelæ of the gangrene.

The question of amputation, though a subject of much discussion in cases of common gangrene, could, in the hospital gangrene that I have been describing, admit of no hesitation. For, although the line of separation neither need, nor ought to be waited for, in several cases of the former description, yet the phenomena of the disease, and the appearances on dissection, forcibly impressed the impropriety of attempting to operate before the fever had abated, and the sloughs began naturally to detach themselves. To give amputation every possible chance of success, separation of the patients on whom it was performed, from those labouring under gangrene, was indispensable: the skin was detached as little as possible from the muscles, and the bleeding from the smaller vessels was restrained by pressure, and dossils of lint dipped in ol. terebinth., while

the ligature on the larger trunks was applied as described already, by cutting short both its ends.*

At this period I was not fully acquainted with the decisive testimony of M. Delpach, in favour of the actual cautery, or I should have assuredly tried it, notwithstanding the general prejudices against it; neither did I then know of the great efficacy of arsenic, as employed by Mr. Blackadder at Passages, the place from which, as I have already said, so many of our cases were brought. There can be no doubt of the utility of arsenic at the station where he first employed it. His mode, as he has stated it, was as follows:—

“ As it is of great importance to have the sore made perfectly clean, and freed from the viscous discharge, and as this cannot be easily effected by common means, without occasioning a disagreeable oozing of blood, and a considerable degree of pain, the following method will be found not unworthy of attention: Two tin vessels should be provided, in the form of large hospital tea-pots, and which are for the purpose of containing a weak solution of the sub-carbonate of potass, the one with cold, the other with tepid water; as it is found, that sometimes the one is most agreeable to the feelings of the patient, and sometimes the other; but the latter is the most effectual in cleansing the sore. This solution, or wash, is to be poured over the sore, while a basin is held in a convenient situation for receiving it, and which ought to be immediately emptied into another vessel, placed at a distance from the patient.† During this ablution, the glutinous matter which adheres to the sore may be gently detached by means of small dossils of fine tow, or lint; but these ought never to be used for two different patients, rigid economy on occasions such as this being a very mistaken principle. The use of sponges in such cases ought to be entirely laid aside, as they can seldom, with safety, be used above once; and such an employment of them is evidently precluded, by the great expense with which it would be attended. When the sore has been thus made as clean as possible, a piece of fine dry lint is to be spread over its surface, and gently pressed into all its depressions, with the points of the fingers. If the surgeon be too nice for this operation, or if he has accidentally wounded

* Dr. Forbes superintended, with the utmost anxiety, the whole progress of this epidemic, and Dr. Boggie, Messrs. Hume, Crofton, Fenton, and Dethick, were unremitting in their attentions.

† “ As circumstances may be such as to render it impossible to keep patients affected with this disease in a separate apartment by themselves, no precaution or artifice that is calculated to prevent its propagation, or to impress a belief in its *contagious* nature, should be neglected. If ventilation be neglected, the surgeon must be more or less to blame, but, during his absence, the patients may have direct intercourse with each other, which, in this disease, is at least equally dangerous, though it cannot always be so easily prevented.”

his fingers, it may be done by means of an instrument, consisting of a flat knob, or ball, attached to an elastic piece of steel, two of which may be readily made of a common elastic steel probang. When the lint is removed, a quantity of the discharge will be found adhering to it: and this operation must be repeated with fresh pieces of lint, until the surface of the sore is made perfectly clean and dry; in effecting which, considerable pain may be experienced by the patient, whose feelings must be soothed; but he will soon have occasion to be grateful for the pains that have been bestowed upon him; for this preparation is greatly conducive to the speedy operation of the principal remedy.

“ The solution of arsenic (Fowler’s) is generally found to be sufficiently powerful, when diluted with an equal part of water. In some slight and recent cases, I have found two parts of water to one of the solution answer every purpose, and I have sometimes used it undiluted; but this will very seldom be found necessary.

“ The patient, or his attendant, should be provided with a small wide-mouthed vessel, containing a quantity of this diluted solution, and which ought always to be carefully set apart, and every one made aware of its pernicious effects, when used internally. He should also be provided with a number of pieces of lint, cut into the shape, but a little larger than the sore; one of which, previously soaked in the solution, is to be applied, (the sore being previously well cleaned, as directed above,) kept constantly moist, and renewed every fifteen minutes, or half hour, as may be necessary; for, when the sore is large, and when there is much heat and inflammation, the evaporation is proportionally increased, and renders it necessary to renew the application more frequently. When the sore is in this painful and inflamed state, considerable benefit may be derived from the frequent application of linen cloths, moistened with cold water; but, to prevent the solution from becoming thereby too much diluted, it is necessary to cover the lint on the sore with a piece of oil-cloth, which, however, ought not to be larger than to extend a short way beyond the edges of the sore.

“ When the disease has supervened upon a recent gunshot wound, it is apt to penetrate deep, in the course of the ball; and when there is a counter opening, it not unfrequently extends through the whole course of the wound. In such cases it is necessary to use a syringe, both to clean the sore, and to inject the solution. A slip of fine lint, well soaked in the solution, may also be inserted, by means of a probe, into the bottom of the wound; and when the two openings are at no great distance, and not in the immediate vicinity of the large nerves and blood vessels, the lint may be drawn through the wound in the form

of a seton. Such cases require more personal attention on the part of a surgeon, as the application of the remedy in this form cannot be intrusted to the patient, or his usual attendants. As the solution of arsenic, on its first application, always occasions more or less pain, it is sometimes necessary, particularly in irritable or debilitated constitutions, to administer an opiate, and to repeat it according to circumstances; but this will seldom be found to be absolutely necessary.

" The period required by this application, for effectually destroying the morbid action in the sore, is longer or shorter, according to the progress that has been made by the disease, and the nature of the original sore. The best rule to go by is, to continue its use, until an insensible, dark-coloured, and dry slough, occupies the whole surface of the sore, and until the patient is completely relieved from the burning and lancinating pain, which is, in some degree, characteristic of the disease.

" The slough being formed, the next step is, to assist nature in detaching it; and this will, in general, be best effected by the use of an ointment, composed of equal parts of the oil of turpentine, and the yellow resinous ointment, or two parts of Venice turpentine to one of the resinous ointment. These being melted and mixed together, are to be poured over the sore, as hot as the patient can possibly bear it; over this, a plegget of dry lint, or tow, is to be applied, and retained by a bandage; and this dressing may be renewed, according to circumstances, from two to three times in the course of the day, carefully washing the sore each time with the solution of potass. Under this treatment, the slough will be gradually detached, beginning at the edges, and extending slowly to the centre; and, wherever it appears detached, it ought to be paired off with the curved scissors. It sometimes happens, that the whole slough becomes apparently disunited, and can be readily moved in different directions, while at the same time it is found to be still attached by means of small ligamentous bands, which occasion very acute pain when their laceration is attempted. When these bands cannot be easily divided by the scissors, the usual dressing should be continued for a day or two longer, as the advantages attending an opposite practice is more than counterbalanced by the pain to which the patient must be subjected.

" Instead of applying dry lint, or tow, over the ointment, I have frequently had recourse to a linseed meal poultice, with the view of expediting the separation of the slough: and it certainly answered the purpose, but its effects appeared to be too relaxing. I have also suspected that it acted otherwise than as a mere relaxant to the sore; namely, by its heat and moisture operating as a solvent on the morbific matter condensed in the

slough, (for there is no reason to believe that arsenic neutralizes this matter,) and thereby allowing it to be again applied to the surface of the sore, and to produce that recurrence of ulceration which has been sometimes noticed in cases where such an occurrence could not otherwise be so easily accounted for. And, accordingly, when a poultice was employed, I found it expedient, at each pressing, to touch the new granulations, particularly at the edges of the sore, with the nitrate of silver.

“When the slough is entirely removed, the same dressing should be continued, until the granulations become vigorous and high-coloured; but, as the morbid action in the sore is now destroyed, the future treatment must be regulated by circumstances depending upon the nature of the original injury, and the constitution of the patient. In general, however, the same ointment applied cold, or with the addition of a small proportion of the sub-acet. cupri, will be found the most useful dressing. The lint on which it is spread should be cut into the exact shape of the sore, and not so large as to cover its edges; over this should be applied a piece of smooth oil cloth, lightly rubbed over with soap, and extending from one to two inches over the sore: it should also be notched at the edges, so as to produce a uniform pressure, by means of a roller, with which the whole limb is to be firmly bandaged. By the use of these means, with proper attention to cleanliness, frequent dressing, and correct application of the bandage, (upon which last very much depends,) the healing process will gradually advance; but, after a sore has been affected with gangrenous phagedena, the cicatrizing process seldom, if ever, makes a rapid progress.”

pp. 51—56.

Mr. Blackadder, in his very interesting work, from which the above long but valuable quotation is made, considers the hospital gangrene as a local disease, and not communicable by the atmosphere, but solely by inoculation. No man can doubt that it is very frequently communicated in the latter way, but if what I have already stated, from my own knowledge of the disease at Bilboa, is insufficient to show that it is also communicable by atmospheric influence, the following facts from the paper of Professor Brugmans, to which I have already referred, will, I think, very clearly prove it.

“At Leyden, in the end of the summer of 1798, in the French military hospitals, hospital gangrene prevailed in one of the low wards, whilst the patients who had slight wounds, and who were placed above this ward, in a well-aired garret, were found to escape the disease. The surgeon judged it necessary to make an opening in the floor, in order by that means to afford an outlet to the air of the infected ward by the roof. Thirty

hours afterwards, three patients, who lay next to the opening, were attacked by the disease, which soon spread through the whole ward.

" In the preceding cases, the contagion was diffused in the atmosphere, and the miasm to all appearance, applied directly to the surface of the ulcers. The following cases give rise to the suspicion that this disease may be produced by the inspiration of the deleterious matter.

" In the month of August, 1805, I saw in one of the wards of a hospital at Amsterdam, four patients whose wounds showed unequivocal symptoms of gangrene. The disease did not exist in any of the other wards. The patients in the above-mentioned ward were removed, and the necessary precautions taken; none were left in the apartment but the four gangrenous patients before noticed. The number of wounded, however, became so considerable, that, on the following day, it was absolutely necessary to place two men in this ward; these patients had each a benign ulcer, situated, in one, above the malleolus of the left leg, in the other, on the internal side of the thigh; they were dressed out of the ward almost in the open air, and the dressings covered with a wet bladder, so that the air of the ward could exert no direct influence on the ulcers; the dressings were carefully removed twice in twenty-four hours. Notwithstanding these precautions, the fever which precedes hospital gangrene appeared in the first patient, twenty or twenty-two hours after his admission into the ward; in the second, nearly thirty hours later, and both were attacked by the disease.

" All the surgeons who have described this disease observe, that it is communicated by the pus of the ulcers which are affected by it, and by every thing which can be impregnated with that pus, as charpie, linen mattrasses, woollen coverlets, blankets, &c.; this has been confirmed but too often by my own experience. The ordinary methods of purifying linens are not sufficient to destroy the power of the contagious matter. In the year 1797, a quantity of charpie was bought in France, and distributed to the different hospitals in Holland. In every place where ulcers were dressed with it, a very violent hospital gangrene broke out. The circumstances were inquired into, and it was discovered that the persons from whom the charpie was purchased had been in the habit of washing and bleaching that which had been used for dressings in the great hospitals, (and which is commonly impregnated with pus,) then arranging and selling it as new. This proves that simple washing is not sufficient to destroy the miasm. The celebrated Pelletan has seen hospital gangrene produced by the employment of charpie, which had been for several years shut up in chests at the Hotel Dieu. Many scientific persons have remarked, that hospital gangrene

has often appeared after the use of the instruments which had touched ulcers infected with this disease. Pouteau also has made this remark " pp. 22—25.

Of the last fact mentioned by Pouteau no one now doubts, and I think, after reading what is stated by the Leyden professor from his own knowledge, few will be disposed to question that the disease is communicable by the atmosphere, and that the fever often appears before the local symptoms.

On one occasion, I have seen chronic gangrene prevalent in a military hospital, but it was at its termination, and when it had ceased to be infectious. Twelve subjects were handed over to me by the late Staff-surgeon Bell, at Abrantes, in September, 1812, reported to have had the disease very violently, and it was said to have carried off vast numbers previously. The hospital was situated upon the southern, or Alemtejo bank of the Tagus, in a low, flat, moist, olive-ground, occasionally overflowed by the river. In its neighbourhood was the great commissariat dépôt, where vast quantities of cattle were daily slaughtered, and where, from the number of carts, oxen, and mules hourly traversing the adjacent fields, the soil, intermixed with their food and ordure, and occasionally with damaged biscuit, was trodden down into a thick, tenacious, offensive compost, on which a burning sun acted almost constantly. On the northern bank, the hill on which the town of Abrantes was built, rose to a considerable height, and intercepted the currents of the winds, forming, by following the natural bent of the river, nearly a quarter circle round the hospital grounds. This stagnation of air was most obvious in the morning, when the inhabitants of Roscio (as the little village was called, were enveloped in dense fog, which was seen rolling languidly along the plain, by the inhabitants of the higher ground. The sick were here, for the most part, accommodated in tents during the short time of their stay; for it was principally a passing station, to collect them from the southern line of hospitals, and forward them to Santarem and Lisbon by water. The natives were universally affected with remittents and obstinate intermittents in the autumnal months, and their general sickly aspect sufficiently betrayed the unhealthiness of their situation.* All the subjects of the hospital gangrene had either remittent or intermittent fever, complicated with dysentery, which they had brought with them, or contracted in camp. The sores had been originally wounds, but when I saw them they had no regularly defined shape nor figure, but had precisely what Mr. Bell notices, "the appearance of a half putrid neglected limb, lying on a dissecting table" The mode of cure I adopted, and which my predecessor had instituted, was as fol-

* Even children at the breast were affected with intermittents.

lows:—After putting the patients into separate tents, cleaning their wounds and persons, destroying all the former dressings, and removing every thing to which the slightest suspicion of being imbued with the poison could attach, I administered the bark, with large doses of opium, camphor, and ammonia, and a liberal allowance of wine and nutriment. The parts were covered with powdered charcoal, and over that a fomenting poultice; the dressing was confided to an able assistant, Mr. Goodrich, now of the 6th infantry, and no hospital servant was ever allowed even to touch the dressings, during the application of which the gases from nitre and common salt were extricated by the usual means. Under this treatment, these cases improved; and although shortly afterwards the system of separation was changed, and syphilis, dysentery, and gangrene, were brought under one roof, the contagion did not spread, and I lost only three of those very unpromising patients.

I had occasion to observe some cases of hospital gangrene, in the year 1815, at Brussels. The city of Brussels is divided into the low and high town; the former is built on the declivity of a hill, at the foot of which the river Senne flows. The prevailing winds are west and south-west and northerly, and blow from the one or other of these points the greater part of the year. The northerly and westerly winds carry with them the vapours from the Dutch coast and the north sea; the easterly and north-easterly winds are impregnated with the humid vapours from the Grand Canal, which is situated in the centre of the low town, and from the extensive forest and marsh lands in the neighbourhood of Soignies. The prevailing diseases of Brussels are catarrhal complaints and intermittents, but, above all, phthisis pulmonalis. From the observations of the superintendent of the military hospitals, it appears that all the most troublesome cases of intermittent treated in them, occurred among the soldiers quartered in a barrack called the "Petit Chateau," situated among the stagnant waters and the filth of the town: at the same time, all the cases of fever of the typhoid type which came from these barracks were of a much more severe nature than those which occurred among the soldiers quartered in the barracks of the Jesuits and the Annonciade, which were so much higher situated.*

At Brussels, the few suspicious cases that occurred at the Jesuits' Hospital, the highest situated and best aired of any establishment in that city, and which came under my charge, all terminated successfully, by separation, the application of the carrot poultice, free venesection in the commencement, and

* Every medical scholar knows the *Medical Topography of Brussels*, by Lomius. A very interesting paper upon the subject will be found in the "Actes de la Société de Medicine de Bruxelles," tome i. partie ii. p. 127, by Pollart.

steady purging afterwards. It principally affected robust and dissipated subjects, sent in from the convalescent hospital, or from quarters in the town, and presented the circular sore, with the accompanying fever of the inflammatory type. Any cases that originated in the hospital were from the lowest and worst aired wards, and those where the patients lay on low hospital stretchers.

In another hospital at Brussels, the Gendarmerie, which lay very low, and had been originally a sort of police barracks, filthy in the extreme before its occupation as a hospital, and, from the circumstance of its having been the last establishment which had been opened, filled with prisoners of war, the dispersed remains of the various actions, who could not be moved off the ground by the ordinary means, incapable of assisting themselves, and depressed and maddened by defeat: * the gangrene showed itself by a most rapidly spreading and destructive sloughing of the stumps, of the true circular form, with a deep red border all round, acutely painful, and accompanied with violent fever, which commenced with shivering, succeeded by a hot stage, but seldom followed up by sweating. The skin was dry and parched, and towards the close of the disease of a yellow tinge; the tongue foul and loaded with a yellowish sordes; the pulse hard, full, and bounding; the bowels universally constipated; occasionally severe pain in the head, and in some instances delirium. The fever was constantly present with the sloughing. I have reason to suppose that the sloughing in some cases preceded the fever; but in all the others, as nearly as could be traced by attentive inspection of the sores, particularly some weeks after the establishment of the hospital, both appeared at the same time. In eight or ten days the violence of the fever abated; but often for three weeks it continued to harass the patients, though less violent in its effects. An emetic and purgatives at the commencement generally relieved all the symptoms; the cases were separated as speedily as possible on the first appearance of the complaint, and the state of the bowels was particularly looked to throughout its duration; a variety of local remedies were tried, but no decided advantage accrued from any so long as the febrile symptoms continued

* Three hundred men were collected in this hospital, the majority desperately, not to say incurably, wounded. Among them were *one hundred and forty compound fractures*, viz. 86 of the thigh, 48 of the leg, and 6 of the arm. They had been collected all over the country by the peasantry, and dragged from barn to barn, often without food or dressings, and did not arrive at Brussels until various periods, from the 8th to the 13th day after they were wounded! It must have been to some of these men recently brought in that Mr. Charles Bell alludes at p. 319, of his Quarterly Report, Part iii. where he describes the state of a wound "*fourteen days after its infliction, when nothing has been done.*" As surely no body of men ever laboured harder in the cause of humanity than the British surgeons after the battle of Waterloo.

unabated. A favourite external application was a liniment composed of equal parts of balsam of copaiba and tincture of myrrh; it seemed on its first application to sooth the pain; poultices, from their weight and the uneasiness they occasioned, were early discontinued.

Not having served in the Gendarmerie Hospital I have given the above state of symptoms from the report of a gentleman (Dr. Knox) who most assiduously attended to the patients. By the liberality of Dr. Theodore Gordon, who was also for some time stationed at that hospital, and whose account sufficiently speaks for its own accuracy, I have been favoured with permission to copy his statement of the symptoms as witnessed by himself.

“The patient becomes restless and uneasy; he has a sense of pricking, shooting, and lancinating pain in the stump,—it cannot be called spasm; he becomes hot and thirsty; his pulse is jarring, and the whole arterial system in a very tumultuary state; a rigor, and regular paroxysm of intermittent has in one or two cases about this time intervened. A small dark-coloured spot is observable, not always confined to the edge of the sore; its circumference is very tender; the centre itself is by no means so,—the very reverse; it spreads, the whole face of the stump becomes gangrenous. The constitutional symptoms keep pace with the local ones. The tongue becomes furred; delirium, with the greatest prostration of strength, and a yellow suffusion of the skin, generally closes the scene.”

The 7th, 8th, and 9th days were the periods when the stump began to assume these appearances.

In the Elizabeth Hospital at Brussels, a building which lay low, but was clean and well ventilated, some cases of gangrene appeared, but originally and principally in the lowest wards. The sloughing was almost universally preceded by fever, and the remedies employed were the diluted nitric acid and poultices externally, with purgatives, and occasional emetics.

In a hospital in the neighbourhood of Brussels, situated at about two miles from the city, on a swampy flat covered with trees, through which the great Antwerp canal was cut, and the Dyle and several tributary branches crept along, the Brunswickers had their hospital establishment. Their wounded lay on the floors, and were much crowded. Gangrene raged there; it frequently seized a stump three hours after amputation, and, when I visited that hospital, twenty-eight days after the battle, one solitary survivor alone marked the performance of a successful amputation. Bark internally, and external stimulants, appeared to have been the plan of treatment adopted. The nature of the accompanying fever was typhoid.

Dr. Pockels, surgeon-in-chief of the Brunswick troops, who served at that hospital, has, while I was engaged in preparing

these sheets for the press, given me some farther information on the subject. He says, "Almost all the amputations which we performed in the hospital at Laecken, immediately after the battle, terminated fatally. Some hours after the operation, the patient was seized with fever strongly resembling the yellow fever; a violent rigor was soon succeeded by heat and sweating, coma, yellow skin, and gangrenous spots on the stump. The accession continued for an hour or two, and returned in five, or eight hours after. Almost all those who had suffered amputation died of it the first or second day after the operation.

"These fatal symptoms naturally induced us to leave many of the great wounds to nature, and the more as we observed that by thus leaving them, the trumatic fever was not excessive. This circumstance enabled us to effect the cure of some of the most serious injuries, cases which, according to the rules of military surgery, would have demanded amputation."

It was the dread of this fever which induced Dr. Pockels to defer amputation in the case of Major B. mentioned at p. 153. The progress of the fever was so quick, that there was no time for ascertaining the effect of remedies. The stimulant and the antiphlogistic plans were equally unsuccessful: dissection afforded no explanation of the nature of the disease. In two cases the blood was found much dissolved, and the liver and spleen preternaturally soft. In all the other cases, nothing appeared to account for the mortality. Besides the gangrenous affections which were accompanied or combined with this fatal fever, Dr. Pockels recognised the ordinary hospital gangrene; but it appeared principally in hospitals higher situated, and prevailed for a much longer period than the former, the malignity of which abated considerably after the first fortnight. A fever of a similar kind, accompanied with rapid gangrene, is described by M. Larrey as having attacked the French wounded in Egypt.*

The practical conclusion which I would draw from all that I have seen or heard of this formidable disease, is, that although, by discriminating the type of the accompanying fever, we may arrest the progress of the disease, or although a modification of gangrene (which has occurred to others) should arise, in which local remedies alone, or with very little constitutional assistance, as a purge or emetic, are sufficient to put a period to its progress; yet that many valuable lives may be sacrificed before the propriety of these means, whether general or local, are satisfactorily confirmed; and that it is therefore a duty of the most urgent kind, at once to break up an establishment where any suspicious sores may occur. In civil life, a multiplicity of causes may tend to obstruct this measure, but in military hospitals no such objec-

* Memoirs, vol. ii. p. 18; or Waller's Translation, p. 76.

tions can possibly prevail. Tents, huts, and other temporary accommodations, which the experience of a campaign sufficiently points out, are always within our reach.

Before dismissing the subject of hospital gangrene, I may observe, that by an analysis of the air in wards affected with this contagion, M. Brugmans has clearly ascertained that there exists in it a peculiar animal matter, highly disposed to putrefaction; that the oxygen gas is considerably diminished, and the azote and carbonic acid gas augmented; and that by the tests of nitrate of silver, acetate of lead, and oxygenated muriatic acid gas, the presence of sulphuretted hydrogen gas is detected. See his most interesting paper, "De l'Etat et de la Composition de l'Atmosphere," already referred to.

OF MORTIFICATION.

Another morbid state, which very frequently accompanies those accidents so peculiarly the object of the military surgeon's attention, is the gangrene or mortification to which all gunshot wounds are more or less inclined, and which is unconnected with contagion. My object is not at present to enter into the general history of gangrene, which is well understood, but merely to state the question respecting the practice to be followed in cases where the removal of a limb becomes the object. The line of separation has long and universally been regarded as exclusively leading to the formation of a correct opinion of the particular spot to be operated upon, and the precise period to attempt the operation: and where mortification has been produced from causes existing only in the constitution, or where, by sympathy, it has been originally led to suffer, and has at last become completely implicated, we can have no better guide. Could we set bounds to this constitutional affection, and prevent it from degenerating into an action by which the safety of the whole system is threatened, we need never seek any other; but, unfortunately, we too frequently meet with cases, and particularly in military surgery, where this saving constitutional effort is never made, or not made until too late, and where to wait for it, is therefore to expose the patient to certain death.

The division of mortification into traumatic and spontaneous, as laid down by M. Larrey,* is one of great practical importance; it has been deduced from long and attentive observation; it is consistent with what the practice of every military surgeon

* Memoires de Chirurgie Militaire, tom. iii. p. 142, *et sequent.* Guthrie on Amputation, p. 63.

must have suggested, and it fully justifies the adoption of the rule of conduct announced by him, viz. "that when mortification is the result of a mechanical cause and puts the patient's life in danger, we need not wait until the disorder has ceased to spread."

By the adoption of amputation upon the field, or as soon after as possible, the cases of this nature will be much diminished in number; but still occasional instances will occur, where to wait for the line of separation is to risk the life of the patient.

The practice has been frequently followed by British surgeons of both the naval and military services, and their testimonies in its favour are the more valuable, that they have been given, not in support of any favourite plan or theory, or in the quality of institutors of a new system, or promulgators of a new discovery, but simply as the result of their own practical experience. I cannot omit quoting the testimony of one of them on this subject,—a subject, for the introduction of which to the notice of army surgeons, in a special dissertation, we are exclusively, I believe, obliged to M. Larrey, and to the justice of whose remarks the dispersed and insulated observations of others, both before and since his publication, will bear ample evidence. In a work which appeared in 1807, giving an account of the practice adopted so far back as 1782, by Mr. Curtis, a naval surgeon, some very satisfactory observations occur on this point.* "Some patients," he observes, (p. 229,) "with spreading gangrenous sores of the legs and feet, were probably lost from an idea that was entertained that gangrene and mortification depend always on a disease of the system, and on a morbid condition of the solids and fluids, which must be corrected before any operation can succeed. And it must be confessed, that the directions in books of surgery generally run in this way, at least they commonly direct that we should wait till nature makes an attempt to separate the dead from the living parts; but this opinion, so far at least as affects Indian practice, and the hospital gangrene of that country, is not well founded, nor, perhaps, with respect to such mortification as is the immediate consequence of external injury in general."

Mr. Curtis then gives a case of amputation after fracture near the ankle-joint, from the fall of a mast, which, though unsuccessful, is valuable on two accounts: first, that the gangrene which led to the operation did not spread to the stump; and, secondly, that the dissection, though brief, demonstrates the improved state of the parts, and the actual removal of some of the diseased appearances. The symptoms which preceded death,

* An Account of the Diseases of India, as they appeared in the English fleet, and the naval hospital at Madris, &c. 8vo. Edin. 1807.

in this case, had evidently no analogy to those arising from gangrene, but the dissection is still more clear:—"On inspecting the stump immediately after death, the swelling of the thigh was so much reduced as to loosen all the bandages; a fine suppuration was beginning to appear, and the skin laid over it was adhering; the ecchymosis left above the incision at one spot was now quite gone off, and the skin had returned to its natural colour." This gentleman also adopted the plan as preventive of hectic fever or absorption of putrid matter, and he gives one instance where it was successfully performed while gangrene was rapidly spreading from improper bandaging.

I met some years ago with a case very similar to this: the injury was effected by repeated and severe blows of a stone, producing no less than three distinct fractures of both bones of the fore arm; mortification set in, and, without waiting for any line of separation, I removed the limb, and the stump nearly healed by the first intention. My friend, Deputy-inspector Pitcairn, of the Irish staff, favoured me with his assistance on this occasion. I had also, in some instances, operated after gunshot injuries before I saw M. Larrey's book. Emboldened by his observations, and following his rules, I have since repeatedly done so without waiting for the line of separation; and although I certainly was not uniformly successful, I have no reason to imagine that death was occasioned by a departure from the rule so generally laid down by authors.

Among the great number who have written upon gangrene, many valuable observations are to be found. Kirkland and Sharp in England, and O'Halloran in the sister island, have dedicated a part of their labours to the investigation. In Mr. Hunter's invaluable work on inflammation, every line of which is of importance, much interesting matter will be found; but, perhaps, we owe to France the most perfect account that has ever appeared. I allude to the "Traite de la Gangrene" of Quesnay. Many scattered notices, together with the majority of the special treatises on the subject, have been analyzed by Dr. Thomson, and their matter condensed in his Lectures on Inflammation, under the head "Mortification."

CHAPTER XIV.

OF TETANUS.

THE last and most fatal general affection incident to wounded soldiers is tetanus. Happy should I be could I afford any thing satisfactory on this dreadful complaint; but, in truth, my observations have tended more to show me what I could *not* trust to, than what I could place the smallest reliance on, when the disease was once fully formed. Was it my object to offer plausible theories, or unsupported conjectures, I could with ease accumulate references to authors, both ancient and contemporary; but it must be confessed, notwithstanding all that has at various times been written on the subject, that we have not arrived at any certain conclusions, nor perhaps have we yet fallen upon the path of investigation which is to lead us to them. The theories of the disease, and the remedies proposed for its cure, are numerous; and while the opposite natures of the latter will at once lead an unprejudiced judge to hesitate as to their value, the candid avowals of almost every surgeon's conscience will confirm their inefficacy. The facts, the deductions from them, and the remedies employed in consequence, all require arrangement; and it may still occupy years of impartial investigation, and of minute inquiries in morbid anatomy, before we can be able to emerge from our splendid poverty, and from the apparent multitude of our stores select a few of sufficient value, on which to found a solid structure of practical utility.

I have never been fortunate enough to cure a case of the Acute Symptomatic Tetanus; in some instances of the Chronic species I have effected or witnessed relief. I shall not take up the reader's time by detailing my disappointments; they embrace almost, if not altogether, every remedy that has come within the knowledge of practitioners. It will be seen by a reference to Sir James M·Grigor's paper in the sixth volume of the Medico-Chirurgical Transactions, upon the diseases of the army in Spain, how little dependence could be placed upon any of the remedies employed in the disease; and what I shall briefly state upon my own evidence, will, I fear, tend in no degree to enhance our confidence in their general usefulness, or their applicability.

In one instance, I have known a cure effected by the injunction of the unguent, hydrargyri; but several weeks after its use, the patient expired of mercurial marasmus. In another, am-

putation of wounded limb relieved all the symptoms, but the patient died, of a fever, which hung upon him during the whole period of the complaint, and carried him off in the sixth week. In my last case, venesection and the use of the tobacco injection, (which brought, away enormous quantities of hardened feces,) after five days' perseverance relieved all the symptoms, and the employment of ether, and the tincture of opium in frequent small doses, removed the occasional spasm that occurred, the bowels being carefully watched. The disease lasted for seven weeks. But in another case, precisely similar, treated in the same ward at the same time, on the same plan, and by the same medical assistant, the usual termination occurred on the 15th day.

The period of invasion, and of the time which may elapse before an immunity from attack can be with confidence looked for, are quite uncertain; and it is a fact, not a little curious, that patients, under similar circumstances, in every respect, of age, diet, nature, and period of infliction of wounds as well as accommodation for their cure, shall become liable to it in one hospital or district of a town, and be free from it in another. This was very obvious after the battle of Thoulouse. Passion or terror after wounds and operations has been known to produce the disease in some; and sympathy, though a rare cause, has occasionally given rise to it in others.

In this disease, at least, the warmest advocates for the sanguine powers of nature have nothing to bring forward in favour of spontaneous cure. One case is alluded to by a recent French writer,* but without throwing much light upon the subject: indeed, nature seems to be very much at variance with herself in many points connected with this dreadful interruption to her economy. Exposure to different temperatures appears equally to predispose to it, and the various forms of the disease are produced indiscriminately by similar causes. Although the Emprosthotonos is an occurrence so rare, that I have only seen one case which approached to it, yet that case was observed at the same time, and in the same hospital, with the various degrees of trismus, rigid spasms of almost every muscle of the body, and violent periodical convulsions, all from similar injuries to that in which it was produced. From the state of the pulse, I have derived no clue to either the proper treatment or the probable event: it has, in the cases I have met with, been astonishingly unaffected. From the state of the skin, I have been left equally in the dark. Sweating, which some have imagined critical, I have seen excessive during the whole course of the disease, and attended with a most pungent and peculiar

* Briot, *Histoire de l'Etat et des Progres de la Chirurgie Militaire en France, pendant les guerres de la revolution*, 8vo. Besançon, 1817.

smell, while in others it has never appeared at all: and suppuration, which is generally interrupted, I have seen continue unaffected by the spasms. Even the process of healing, which, it would be reasonable to conclude, should be altogether put a stop to, has gone on apparently uninfluenced by the disease; and in the most severe case I ever saw, which occurred after a shoulder-joint amputation, sent in to Elvas from before the lines of Badajoz, the life of the patient and the perfect healing of the wound were terminated on the same day. I have, in short, observed no symptom, among the great numbers detailed by writers on this disease, invariably present, except obstinate costiveness. Neither are the species of injuries which produce the disease uniform in their effects. Wounds below the elbow and knee have been those which I have seen most frequently followed by it, but by no means to the exclusion of injuries nearer the trunk, of the trunk itself, and of the head. In almost all the instances that I have seen, the patients have been exposed to a stream of air directly blowing upon them; this has been sometimes cold, and at others of a high temperature.

In the dissections which I have made of cases of this disease I have been much disappointed. I never found any peculiar appearance of the wounds themselves except in one, where the radial nerve was somewhat thickened, and a small splinter of bone was sticking in it; the man lived six weeks: and one where, after amputation of the fore arm very high up, I found the muscles a good deal injected with a serous effusion, and an effusion of the same kind surrounding the vessels; the nerve which I suspected had been included in the ligature, seemed perfectly sound, but the vein was ulcerated for two inches from the ligature, and its coats thickened to nearly the extent of a quarter of an inch, the inflammation spreading on to the heart. This man, who was treated by a German surgeon, was seized on the fifth day from the amputation, and bled very copiously; he died on the 8th. The dissection, which was performed by my friends Mr. Crofton and Mr. Dobson, was extremely embarrassed by a thick crust of bark, which surrounded the wound, and penetrated into and stained all the parts in the vicinity.

I have never been able to trace the peculiar appearance and effervescence of the intestinal contents, as mentioned by M. Larrey, repeated by his English translator Mr. Waller, and confirmed by my friend Dr. Dickson; nor any other peculiarity which did not appear to me to be fairly attributable to the remedies used; and any inflamed or lacerated appearances on the stomach or abdominal muscles, the fauces, larynx, &c. which are frequently observable, appeared to have been more from the effects of an increased flow of blood to them consequent on their increased action, than from any other cause.

Among the great mass of authorities on this point, I would strongly recommend to the perusal of the junior army surgeons, the Memoires of M. Larrey, the Observations of Mr. Abernethy, the paper of Dr. Dickson, in the 2d part of 7th vol. of the Medico-Chirurgical Transactions; the cases of Dr. Parry, Bath, 1814, and a small probationary Surgical Essay by Dr. MacLagan, Physician to the Forces, Edinburgh, 1816, which contains an interesting summary of our present knowledge upon this subject.

The host of authors referred to by Ploucquet, and indeed all other authorities upon tetanus, lose much of their interest if unaccompanied by dissections. Some recent occurrences, and particularly a case detailed by my friend Mr. Webster, surgeon of the 51st regiment, in the Medico-Chirurgical Journal for October, 1817, have determined me to lose no opportunity of minutely examining the spinal cord and the theca vertebralis, in all future cases of acute tetanus, or of a disease in many points very analogous to it, hydrophobia:—a determination, in which I am strengthened by the opinion of the author of the excellent paper in the Medico-Chirurgical Transactions, above referred to. I have already had many communications on the subject; and while some of my informants assert that they have found the vessels of the spinal marrow in a state of congestion, others of equal accuracy assure me that they could detect no change whatever upon them. From some of my correspondents I have obtained information, by which I am perfectly satisfied that some of the changes described as morbid were natural to the parts, and that others were the consequence of a rude use of the saw and chisel. The point may therefore be considered as requiring much more accurate observations, and more accurate dissections than have hitherto been made; although of the frequent existence of congestion in the vessels of the spine, and of consequent effusion into the canal in tetanic cases, there can be no rational doubt.

An anonymous writer in the London Medical Repository, vol. ix. p. 300, has given a much more favourable view of the comparative mortality in tetanus, as it occurs in the East Indies, than I have ventured to contemplate; as his observations appear to be derived from actual practice, I shall avail myself of them. "It is pretty generally known," he says, "that in the symptomatic tetanus from wounds which occur in the East Indies, about one in four recover; and the usual practice which is followed there, is the use of mercury, both internally and locally, with the exhibition of large quantities of opium, spirits, or wine. Some have found the warm bath useful; and in the hands of others, the effusion of water of the temperature of the surrounding atmosphere (which is generally about 80° of Fahrenheit) has

proved a powerful auxiliary in the treatment of the disease. It generally proves fatal before the seventh day."—"At first, the spasmotic affection is generally confined to the parts immediately above the wound; but the whole side of the body is soon afterwards thrown into violent spasmotic contractions; and if a tourniquet or tight ligature is placed above the wounded part, so as to compress the nerves, the spasms will be relieved, and very generally prevented recurring. This measure is frequently of great use in enabling the patient to take a little sustenance, or to swallow his medicine."

In a disease like tetanus every hint is valuable; from good authority I have been informed that digitalis has been recently tried with success; but from a laborious investigation into all that has been attempted in the mode of treatment, I am satisfied that the use of opium, with the interposition of purgatives and warm bathing, has been more successful than any other remedy.

CHAPTER XV.

OF AMPUTATION.

IT is an excellent observation, founded in the purest humanity, and justified by the soundest professional principles, that to save one limb is infinitely more honourable to the surgeon than to have performed numerous amputations, however successful; but it is a remark, notwithstanding its quaintness, fully as true, that is much better for a man "to live with three limbs than to die with four." How many wretches have dragged on a miserable existence, trailing after them a deformed, irritable, useless leg, or vainly attempting to wield an inert, contracted and cumbersome arm, may be estimated by a perusal of the work of the Prussian advocate for those distorted masses of disease, in which, even from his own words, it is obvious that M. Bilguer inflicted a tenfold proportion of pain, and exposed his patients to an incalculably greater degree of danger, than if he had removed their limbs at once. Fortunately for the contending armies of modern times, this specious inhumanity has now nearly passed

away; surgeons no longer hesitate, and even patients appreciate their motives justly, and attribute the loss of limbs to the fire of the enemy rather than to the incision knife of their friends. This very confidence increases the natural desire of a conscientious man to save his patient's limb, and he will persevere in his endeavours until farther forbearance would degenerate into criminality.

The circumstances which lead to consecutive amputation are very numerous; and the influence of existing or preceding disease, natural or acquired irritability, the differences of season, climate, and food, but, above all, the crowded state of the sedentary hospitals, will at an earlier or later period, fix the time of operation. For the precise moment, no definite limits can be laid down; but the judgment of the surgeon must alone be his guide, and this judgment can be acquired solely from a perusal of the volume of nature, and the impressive instructions to be gained in the clinical wards, by a diligent attendance on disease, and by becoming acquainted even with its physiognomy. The most superficial perusal of surgical works will point out the differences of opinion which exist as to the propriety of operation, between those who have practised among robust peasants and in the smaller establishments, and those whose patients have been taken from among artisans and inhabitants of large manufacturing towns and cities, or treated in large, confined and ill-aired hospitals.

The military surgeon anticipates all the consequences of delayed operation, not only from the particular effects it may have upon individuals, but the great influence which protracted suppurations, hemorrhages, diarrhoeas, febrile exacerbations, and hectic sweatings must have upon those who live within an atmosphere constantly impregnated with the effluvia arising from patients suffering under them. To lessen an evil which we cannot altogether avoid, we must lose no time in effectually preventing that deterioration of the hospital atmosphere, to which these diseased processes so materially contribute. On the very day that a subsidence of fever is effectually announced by a free and healthy suppuration; by the abatement of local inflammation; by a restoration of the skin to its functions, demonstrated by returning coolness and elasticity, particularly on the affected limb, we should proceed to perform our amputation on those patients in whom no hope of an ultimate recovery without it can be entertained. We thus do them the strictest justice, and we hold out to the cases reserved for trial the greatest possible chance of recovery. To prepare the patients for this state, much may be done by attention to their bowels; costiveness is a source of great irritation, and not an unfrequent cause of the commencement of the diarrhoeas which so often

hurry off these poor sufferers. Dryness of the skin, and febrile heat, often depend on this state of the bowels, and a relaxation of the one is best promoted by producing that state in the other. The day before an operation, the administration of a purgative is very important; serious inconveniences and among them hemorrhage, are frequently owing to the irritation and repeated strainings to stool, occasioned by costiveness. I scarcely recollect a situation in which bleeding vessels occur more frequently than in the act of passing accumulated feces after an amputation, particularly the lower extremity.

But the grand source of safety to the individual is removal to a distant and separate ward, and, if possible, to another hospital appropriated to the cases operated upon, as soon as his removal is at all practicable. To those who have not had experience on this point, it may appear a very useless, if not a very injurious measure, thus to remove the stump patients; but I hold it as one of the best-established facts in military surgery, that a cautious and well-regulated shifting of those cases from the hospitals, or, if possible, from the towns in which they have been established, is one of the most certain means of ensuring ultimate recovery. I have witnessed hundreds of cases in confirmation of this; I have seen the men, who, on the first day of a transfer from one hospital to another, have been obliged to be assisted into the boats or wagons, or held on mules; enjoy a sound night's repose, awake with a craving appetite, have a free, copious and natural alvine discharge, and proceed on rapidly towards convalescence or a cure, which has been only interrupted by their arrival at a hospital station. When I reflect, on the other hand, on the poor sallow dejected beings that have pined in the hospitals; the flabby non-adhering, inanimate stumps, lined with a discoloured, half digested sanies, which have disappointed my most sanguine hopes—I shudder at the contrast.*

If the effects of gestation have been such as I have now described, when circumstances called for an evacuation of the different hospitals, one upon another, and where the movement was dependent, in a great measure, upon casual transport over execrable roads, and with bad accommodation of every kind; what must it be, if this moveable hospital had its own appropri-

* On this highly important subject, see Jackson's Outline of the History and Cure of Fever, 1798, p. 287. Jackson's Constitution of the Medical Department of the Army, 1803, p. 296. Dr. Wake's *Dissertatio Medica Inauguralis de Typhi Remediis*, Edinburgh, June, 1807; and Dr. Woolaston's *Croonian Lecture*, extracted from the *Philosophical Transactions in Edid. Med. and Surg. Journal*, vol. vii. p. 58. But the most interesting observations to an army surgeon, upon this subject, will be found in Larrey's *Memoires*, vol. iii. p. 38, *et sequent.* In the battle subsequent to the retreat from Russia, many French soldiers began a march immediately after amputation of the shoulder-joint. Larrey, vol. iv. *passim.*

ate mode of transport, bedding, stores, and provisions, with proper servants and medical attendants, on selected roads, and with sufficient hospital accommodation? Without being enthusiastic, or even sanguine, I may be allowed to anticipate most favourable results, and to press such an establishment upon the consideration of those in command. The spare forage wagons of the army might easily be made available for this purpose, and a few hours' exercise might be daily given to the wounded; and, under favourable circumstances, they might be kept in movement within a small circle for several days, encamping at night, and leaving all their filth behind them, while, in the interim, purification of the different hospitals was effecting in succession.

But, to return.—The first class of consecutive operations having been performed, and the subjects of them removed, our unembarrassed attention can be turned to the cases for trial. Of these, the joint cases and the compound fractures are the principal. Mr. Hunter, among the numberless valuable facts which he has pressed upon our attention, points out the much greater danger in the injuries of parts far from the source of circulation, than when near it, even when these parts are similar both in texture and use, as in the extremities. Military surgeons are now in the habit of dividing injuries into those affecting the articulating extremities of a bone, and those affecting its middle portion, which is subdivided into three parts; but the observation of Hunter, so just as applied to the entire limb, does not hold in the parts; for, in the thigh, the injuries of its head and neck, are beyond comparison, more dangerous than those of any other part; next, those towards the middle of the bone, proceeding downwards; then the articulating extremity at the knee; and, lastly, the portion from the condyles to the centre of the bone upwards. In the legs, on the contrary, the injuries of the tibia, near the ankle-joint, are much more dangerous than those immediately below the knee, supposing the joint not to be implicated; and, in the arm, many injuries of the head of the bone and its vicinity may be got over with due attention, while those at the elbow-joint most commonly lead to the loss of the limb. In the fore arm, again, the order of safety becomes reversed, and the injuries near the carpal articulation are less dangerous than those near the humeral. In all cases, the injury from a musket ball is less than from grape shot, and in these less than from round. The state of the soft parts also must be taken seriously into consideration, particularly the blood vessels. From deliberately weighing all these circumstances, together with the peculiar constitution of the patient, and the general healthy state of the hospital, our period of secondary amputation must be determined. In some hospitals, and at certain periods, no opera-

ration succeeds well. In some subjects, also, the constitution seems to have lost all its energies; the parts may be retained in apposition by straps and bandages, but their approximation is mechanical, and not seconded by any healthful effort of nature, while men in the same ward recover fast; obviously demonstrating that localities have no influence on them, although it must be confessed, that generally, when one sore goes wrong, great numbers follow the example; removal then affords the only security for success.

Could we always follow our own wishes, as we sometimes may in the case of officers, or insulated individuals, we would defer amputation until fever of every kind and degree was subdued. This is out of the question in a large military hospital. Where we are at all liable to contagion, we must content ourselves with moderating instead of removing febrile affections. Had a surgeon his choice, he would perhaps wait for an amendment in the sharp, quick, small pulse of hectic, a restoration of appetite, a regularity of the bowels, and a diminution of the sweating tendency, and of the cough. But it is most satisfactory to know, that the removal of the local injury often rapidly affects the mitigation of these sympathetic consequences.

I have very little to add to the numerous excellent works on the operative part of the subject; but, as I think I have derived much benefit from attention to a few simple particulars, I shall briefly state them.

First, Where the tourniquet is used to command the flow of blood, I would advise, that whatever confidence we may have in our assistants, or those around us, the application of this instrument should never be intrusted to any individual; nor should we proceed to operate until we have personally ascertained our perfect command of the circulation. *Secondly*, Where the circulation is to be commanded by the pressure from the hand of an assistant, particularly in the operation at the shoulder-joint, there is not only no necessity for the application of the key, boot-hook, or tourniquet handle, usually employed, previous to beginning the operation; but it is actually hurtful. The long-continued pressure is excruciating to the patient, and is often more the subject of his complaint, than any other step of the business; it is also particularly fatiguing to the assistant, who, by this means, begins to flag at the moment his strength and dexterity are most required. Pott well knew the advantages of husbanding the strength of his assistants, (indeed, what of practical utility did he not know?) and thought it not unworthy to remark upon their tired state;* but

* Remarks on Fractures and Dislocations.

in the operation I am speaking of, the assistant has by far the most serious part of it to manage; and if his management is proper, a more bloodless one, for its magnitude, is not in surgery. I abstain from all comment upon the opinion of Mr. John Bell on the possibility of commanding the subclavian artery; neither is it my object to enter into a competition of sarcasm with those who make this exhausted subject a vehicle of groundless insinuations against the military surgeons. The point is incontrovertibly settled; the vessel can be compressed as it runs over the first rib, with the greatest certainty, and, by an expert assistant, with the utmost ease. I have performed the operation seven times,—twice out of the number by candle light; I have been the compressor of the artery repeatedly, and I have been witness to its being commanded on numerous occasions; but I have never seen the most remote approach to dangerous hemorrhage.* When a large majority of the British hospital staff operated in concert for several successive days at Vittoria, the loss of a wine glassful of arterial blood, when this operation has been performed, was an unusual occurrence; much oftener half the quantity; and in one amputation performed upon an heroic soldier of the Chasseurs Britanniques by Staff-surgeon Dease, assisted by Staff-surgeon M'Lean and myself, the amount of arterial blood lost from the principal artery was no more than the quantity contained between the point of pressure and the point of incision through the vessels. These operations were all performed before numerous spectators; and I can assure my junior readers, that, without any peculiar dexterity, the same result is within their own attainment. Let the assistant first try his power of compression before the operation has commenced, and let him with his eye mark the precise spot well; during the external incisions the pressure need not in the smallest degree approach to violence. When the surgeon is about to make his dismembering cut, or that which, in removing the bone from the socket, divides the artery, firm, steady, and even powerful pressure will be required for the fourth of a minute; within that time the ligature should be secured on the vessel, for it almost always protrudes into the surgeon's fingers; and if it should not it cannot be mistaken, and the tenaculum will readily draw it forth; the smaller branches are soon secured, and I have never seen them troublesome if the pressure is correct. This operation was actually performed at a hospital in the town of Bilboa, by a young hospital mate, on a very urgent occasion, with the assistance of an orderly man only! This fact is curious; but the following sacrifice of prejudice to

* I have not the least objection to the counter security of pressure in the axilla; but if the patient is properly supported in a chair, or laid along on a table, which I much prefer, his yielding to the pressure over the rib is completely prevented. See Mr. C. Bell's Quarterly Report, p. 226, part ii.

vanity, which has come to my knowledge, is perhaps still more so:—A strenuous protester against the efficacy of pressure performed the operation with one hand, while he compressed the artery with the other!!

To perform amputation at the shoulder-joint, I have for some time exclusively employed the mode by a flap formed from the aeromion to the centre of the axilla on each side by a gentle curve, first through the skin and cellular substance on the outside of the arm, then on the inner, so as to mark the flaps and guide the future strokes of the knife; then, with a middle sized amputating knife I cut nearly down to the bone on each side. I then, taking the pointed slip of deltoid which remains attached to the aeromion, lay it down quickly with a scalpel, so as to expose the head of the bone, which I now proceed to luxate; this is done with the greatest ease and certainty by throwing the shattered remains of the arm backward, and thus exposing the long head of the tendon of the biceps; by dividing this tendon, and running the scalpel fairly forward along the groove, its back lying in it as in a director, we are at once conducted into the joint. I have witnessed considerable difficulty in hitting the articulation by the omission of this simple step, which will be entirely avoided if it is adopted; and, indeed, will enable the surgeon to enter the joint blindfolded. By carrying the scalpel fairly round, the capsular ligament is divided from the bone. Resuming the amputating knife, with one sweep in the axilla the two lateral flaps are united, the limb removed, and the flaps brought together with adhesive straps and bandage. This I have found the easiest and simplest mode of performing the amputation, although the dexterity of many of my brother surgeons in the Peninsula and on the Continent was so great, that almost every individual had a peculiar plan, and they finished their operations in as short a space of time as they would have required to describe the differences of their modes from those of others.*

In whatever form we may be disposed to make our flap, we must be guided by the state of the soft parts. If, as very often happens, a round shot has grazed along the top and external parts of the shoulder, laying open the joint, there the flap, by laying back the deltoid, cannot possibly be made. If a musket ball, or a piece of shell, has struck the centre of that muscle and penetrated to the joint, or comminuted the head and neck of the bone, it would be highly imprudent to make a flap of a wounded muscle, ever liable to sloughing. If the shot-holes are lateral, our semilunar incisions may be so contrived as to pass through them and remove all lacerated parts; but if it cannot be so ma-

* This plan may also be advantageously adopted where we mean only to remove the head of the bone.

naged and that they must necessarily remain in one or both our flaps, we must, with the finger and sponge, clear away all splinters, (with which I have sometimes found them full, as if they had been stuffed by art with coarsely pounded bone,) and bring them as nearly together as we can. Wherever the scapula and clavicle are involved, which generally implies an extensive destruction of the soft parts, after removing all splinters, the wound must be lightly dressed, and its future covering left to adhesive straps and bandage, which, if judiciously employed, will very soon effect this purpose, without the use of ligatures or sutures. I have never met with a case where the removal of any part of the scapula by the saw, or even the pairing of the cartilage of the glenoid cavity, was at all necessary, if extensive fracture did not exist.

If the head of the humerus is the only part injured, or if the injury does not spread to any extent along the shaft, it certainly becomes the duty of the surgeon to attempt to save the limb. The following inquiries and considerations, however, appear to me well worthy of being seriously weighed before we proceed to remove the head of the bone. 1. That the splintering of the shaft of the bone may not be so extensive as to reach much beyond the point where a removal of its head could be useful; and here it is to be remarked, that experience almost universally shows that splintering, or splitting of the bone, extends downwards towards *the condyles* instead of towards the head, and the same holds good in the femur, and in the tibia. 2. That the head of the bone being removed, the process of necrosis may not go on lower down, in consequence of an inflamed state of the periosteum, injury of the medulla, or disease of the bone, from other causes not cognizable in the early period of the injury, and to the progress of which no limits can *a priori* be assigned. 3. From these considerations, would it not be most prudent to let the removal of the head of the bone be always a *secondary* operation? Where splinters stick out from a wound in or close to the shoulder joint, or are loose, and within safe and easy reach, and the surgeon supposes the limb is not irretrievably injured, let them be removed, and the edges that might irritate be pared or sawed off: let the original inflammation and fever subside; and then, if the diseased state of the bone and soft parts becomes evidently defined in its extent, let the operation for sawing off the head and unsound parts be attempted.* But where there is not perfect soundness of constitution to bear up against fever, formation of matter, and repeated exfoliations, life may often be lost in the attempt to save the limb.

The history of the hip-joint operation has been ably stated by

* See a case by Deputy-inspector Morell, Medico-Chirurgical Transactions, vol. vii. p. 161.

Professor Thomson, in his "Report;" and Messrs. Larrey and Guthrie have detailed the necessary steps for its performance. I have myself, on two late occasions, performed amputation of the thigh so very high up, nearly embracing the trochanter, and consequently the capsular ligament of the joint, that a very few strokes of the scalpel would have effected the dislocation; more especially, if the head and neck of the bone had been split to pieces, as they very often are. My incision was the common circular one; and I did not, as I once before had done, make the taking up of the femoral artery a necessary preliminary measure; I tied the arteries in succession as they were cut, an able assistant pressing on that in the groin. In the last case I was favoured by the assistance of those excellent surgeons, Messrs. Guthrie and Brownrigg, and the hemorrhage was not at all greater than when the tourniquet is applied higher up. In Mr. Guthrie's hip-joint case, at Brussels, Staff-surgeon Collier and myself compressed the vessels, and the hemorrhage was very little more than in the common amputation with a tourniquet; indeed, the state of the vessels presented nothing difficult to the operator, whose coolness and dexterity were unrivalled. The deaths, as far as my inquiries have gone, have been generally dependent upon the other causes than hemorrhage. The great violence of the injury itself which requires the operation, and the severe shock, are quite sufficient to account for the fatal event. In much less serious operations than that of hip-joint amputation, I have seen death occur on the moment, in men of the most determined courage, and without the smallest excess of hemorrhage. Upon the whole, I believe that we may as safely divest ourselves of all fears of hemorrhage in operations properly conducted on the lower extremities, as we do in those on the upper.

An ingenious naval surgeon, Mr. Veitch, has published a paper upon this operation, in which he proposes to make the first step of it in no respect different from the high circular one, except by leaving an inch or two of the bone projecting, which may be done without the slightest pain or trouble, by dissecting off the soft parts towards the knee, and sawing the bone low down. This projecting piece of bone, he proposes to use as a sort of lever, to assist in the complete dislocation of the head from the acetabulum, which he next proceeds to do, and which is certainly much accelerated by the removal of the unwieldy mass of limb, which was all but separated before the application of the saw.* Where I called upon to perform the operation, I should certainly proceed upon the principle of Mr. Veitch in my first incision, and then cut directly upon the joint, securing the

* Edinburgh Med. and Surg. Journal, vol. iii. p. 129.

blood vessels as I proceeded: although I should promise myself little, if any assistance, from the part of the bone remaining in the socket, as, in the injuries requiring the operation, the bone is generally so shattered, as to possess little or no cohesion of parts, and consequently cannot be employed as a lever. I have seen the head and neck of the femur comminuted into portions, not much larger than a musket-ball, the only adhering part being the fragment into which the round ligament was inserted, and consequently, had an operation been attempted, the surgeon could not have availed himself of any guidance or assistance which might be afforded by the bone in a sound state.

The cases which call for amputation of the hip-joint are either primary or secondary. The first principally arise from grape or cannon shot, or from the explosion of shells, by which the bones in the immediate vicinity of the joint are severely fractured, or the soft parts and blood vessels extremely lacerated. The second may also proceed from the sequelæ of the above-named injuries, or from long and tedious suppuration and exfoliations, occasioned by injury from musket shot, or from the lodgement of balls, &c. in or near the joint. Many other cases may occur where this operation may be deemed necessary, but no prudent surgeon will ever attempt it, except where he can avail himself of the opinions and assistance of others.

In commencing an amputation below a joint, and particularly in a large lower limb, I would recommend placing the right hand under the limb, and carrying it to some extent round, in the position meant to commence the incision, and then *dropping* the knife into the hand, instead of running the hand ready armed with the knife beneath the part. By neglecting this very simple preliminary measure, I have seen some most awkward scratches inflicted on the patient and assistants.

By cutting the first third, or nearly so, of the circle, principally with the heel of the knife, we shall always be enabled to complete the external incision with one sweep of the instrument, a matter of some relief to the patient in point of pain, and of increased facility to the operator, in forming a smooth even edged line. In amputating, I have, in a great measure, followed Alanson's plan, and have given an oblique direction to all the incisions through the muscles, (the first having fairly divided the integuments and fascia,) as much upwards and inwards as possible. This saves a vast deal of dissection of teguments from the muscles, and is a powerful guard against leaving an overhanging and useless pouch of skin. If the incisions are made perpendicularly down toward the bone, a long dissection of skin is necessary; this is recommended and depicted in some of the modern systems of surgery, to an extent which I conceive entirely unnecessary under any circumstances, and which

I know to be highly improper in most. In a small limb, I have repeatedly performed the operation with one sweep of the knife, cutting obliquely inwards and upwards, at once to the bone. The only objection that strikes me to operating in this mode is, that the arteries are sliced obliquely like a writing pen instead of being cut fairly across, and that if this is not kept in remembrance, secondary hemorrhage may take place after the vigour of circulation is restored, in consequence of the whole circumference of the vessel not being included in the ligature. By drawing the vessel fairly out, and placing the ligature beyond the commencement of the oblique cut, this accident will be effectually prevented. In many subjects, however well the tourniquet may have been originally placed, we find a general oozing from the face of the incision, and sometimes the arteries themselves still discharging small jets of blood. When the discharge, from whatever cause, is large, and particularly in very weakly subjects, where a single jet of arterial blood is of vital consequence, I never hesitate in tying the vessels before proceeding any farther, giving the ends of the ligatures to an assistant until the bone is sawed through. This may, to some, appear a very *informal* proceeding; and I have heard it criticized as not being according to the rules of the schools; but a consideration of the safety of our patient should be our only direction, and in no particular should we sacrifice what the dictates of common sense and experience point out as necessary to ensure it, to the rigid formality of rules, or to the pitiful pedantry of never deviating from them.* On the same principle, if we find the bone much splintered, or diseased, or protruding after the limb is removed, or even if, by the retraction of the muscles, or a false calculation of the necessary quantity to be left, a protrusion is probable, we should never hesitate to take up the saw again, and remove the necessary portion; by doing it on the spot, much after pain and misery is avoided.

In the fore arm almost every possible error of projecting bone or insufficient covering is effectually obviated by the flap operation. This is best performed with the fore arm extended, the thumb and little finger in a perpendicular line, and forming the guiding points to the formation of two neat semilunar flaps, which are to be cut out either by the catlin from within outwards, or the middle-sized incision knife in the opposite direction.

* Where the great veins bleed, I have never hesitated about tying them also, in debilitated subjects. I have met with only one case of venous hemorrhage to be fairly traced to contraction of the integuments, as observed by Mr. Iley in his chapter on Amputation; nor did it require an incision of the integuments, as practised by him, but was relieved by loosening the bandages, and moistening the dressings with cold water.

Cases will occur where the hand or foot are only partially injured. By taking advantage of the joints and of the sound teguments, we very often succeed in saving the limb by the loss of some part, and making a tolerable stump, by throwing the cicatrix out of the line of pressure; but no general rule can be laid down for these cases, almost every one of which will require some peculiar management. Where a finger or toe only are injured, they should always be removed at the joint.

In putting up stumps, I have constantly practised the perpendicular cicatrix, supporting the parts after the application of the usual adhesive straps with intervals of an inch left between them, by a band of plaster about three fingers' breadth, put moderately tight round the whole, so as gently but steadily to compress all the parts, particularly those that are concerned in the process of adhesion around the end of the stump, and, together with the roller, to moderate or prevent muscular retraction.* But if circumstances of diseased skin or muscle, wasting or distortion of the limb, accidental irregularities in the sawing of the bone, or intentional removal of a part of it, (as the spine of the tibia,) do not admit of the perpendicular line, I always place the lips of the wound in that position which most favours the perfect cushioning of the bone, without rigidly adhering to any particular line of cicatrix.

To perform amputation a second time may appear a barbarous, and certainly is a very severe operation; it sometimes, however, becomes necessary, from osteo-sarcoma, extensive necrosis, abscesses of the medulla, unsuspected fissures, phagedena, or great protrusion of bone, with an extensively diseased periosteum, where the powers of nature are inadequate to the cure. It must be confessed, that although the former causes are frequently productive of this most unpleasant result, yet an awkward operation in the first instance, and subsequent improper dressing, have but too often a full share in occasioning the mischief.

If the general health is not impaired, and the flesh does not peel off from the bone as if it were boiled, the efforts of nature may be trusted to, aided by proper bandaging, and, in some cases by the employment of the saw; but when restless nights, intense pain, flushings, and irregular bowels, with great tumefaction and hardness of the stump take place, indicating approaching hectic, and there is evidence of an irregular action of the parts, osseous matter becoming deposited and forming a distinct tumour around the stump, our best plan will be to operate

* Shaving the parts is often neglected, and gives rise to great irritation in removing the straps. It is worth while to recollect, that the hair grows much faster on an inflamed, than on a sound piece of skin.

again nearer the trunk. In cases of long standing, no partial removal of bone will supersede this necessity, for the soft parts in the vicinity of the bone take on a diseased action, from which they never recover. A generous diet, and removal to a pure air, if possible distant from a hospital, will be indispensable to recovery after operation.

On the subject of this class of diseased bones, which is so highly important to the hospital surgeon, Bonn, "Thesaurus Ossium Morbosorum," Amstelodami, 1788, and Weidmann, "De Necrosi Ossium," Francofurti, 1798, are excellent; and the Thesis of Macdonald, "De Necrosi ac Callo," Edinburgh, 1799, is highly interesting. Louis has given some excellent papers in the 2d and 4th volumes of the Memoirs of the French Academy, on bone projecting after amputation. Levillé has published a memoir, "Sur les Maladies des os apres Amputation," in the Mem. de la Soc. d'Emulation, tom. i. p. 148. A comprehensive inaugural dissertation, with some good plates, was published at Leyden in 1803, by Van Hoorn, on the same subject; and Roux published a prize essay, "De la Resection d'os Malades," at Paris, in 1812. The "Mémoires de Physiologie," published at Paris in 1804, under the joint names of Scarpa and Leveillé, are also well worthy consulting.

The causes of death after amputation are various. Fever, whether symptomatic or endemic, and mortification seizing the stump, often cut off our patients. Sometimes the febrile affection is of a chronic nature, and soon degenerates into hectic, with cough, and every symptom of phthisis; and often the patient sinks, arrested, as it were, at once by the hand of death, without running through any of the intermediate stages between the attack of disease and dissolution.

Dissection throws some light upon this interesting subject, and the results may be classed under the following heads.

1. *Inflammation of the vessels.* In some cases the veins, in other the arteries, and in others again both the veins and arteries, will be found inflamed; from the point of the stump to the very auricle or ventricle, and in many parts, either lined with coagulable lymph, or filled with purulent matter to various distances. In the dissections conducted by Messrs. Dobson, Bingham, and Crofton, after the battle of Waterloo, we met with no less than twelve cases where the veins were inflamed, and where, at the same time, purulent matter was found in the arteries, with a considerable thickening of their coats. In one case we found the brachial artery alone affected. For three inches from its cut extremity it was very much thickened and filled with pus. In another case, dissected by Hospital-assistant Dobson, the amputation had been performed low on the femur; —death ensued on the 17th day. The artery was not diseased,

but the vein was inflamed from the point of the stump to the very auricle, and of a very bright pink; when both iliac veins were taken from the body, the contrast was most remarkable; that on the sound side preserved its natural appearance, which, however, at the junction of the veins terminated abruptly, as it were by a regular line. In those cases, although after the first discovery of inflamed vessels, they were closely watched, the symptoms were not of such a high inflammatory nature as to demand bleeding to any great extent; and, in some, symptoms of a typhoid character appeared. External cold applications, leeches to the parts, and the administration of the mass of blue pill, succeeded by saline purges, were the measures we adopted. I am not aware of any distinctive marks between the arterial and the venous inflammation in these obscure cases.*

2. *Metastasis to some of the great cavities, or organs.*—Large quantities of purulent matter are sometimes found in fatal cases of amputation, in the thorax, either in the substance of the lungs themselves, or floating loose in the cavity; or serous effusions, and great congestion of blood in the body of the lungs, with conversion of them into a substance resembling liver, designated by the appropriate appellation of *hepatization*, by the French surgeons. In the abdomen abscesses are often discovered, particularly in the liver, and at a very short period from the removal of the limbs. In the adjacent joints also, matter is frequently found. I have met with it in three cases in the hip-joint, where the operation had been performed in the thigh, and two in the shoulder-joint, where the arm was carried off by cannon-shot; and even in parts still more distant from the original injury, diseased actions; apparently sympathizing with the state of the stump, have also been discovered. Mr. Guthrie has met with the thyroid gland almost totally suppurated. I know of no particular set of symptoms that peculiarly characterize these instances of metastasis. Great irritative fever has been present in some cases; hectic and topical affections of the chest, as dyspnoea, cough, and sense of suffocation, have been found in those where metastasis to the thorax has taken place; and

* Much information on this point will be derived from the papers of Mr. Hunter, in the 1st volume of the *Medical and Chirurgical Transactions*; of Mr. Carmichael, in the 2d volume of the *Transactions of the College of Physicians in Ireland*; and from an *Essay* by Mr. Travers, in the first part of the *Surgical Essays* by him and Mr. Cooper. From some observations in this last paper, it might be supposed, that in the army we *always* tied the veins, and that ligatures were necessarily fatal; neither of these suppositions are correct; we put a fine ligature on a vein, when dangerous hemorrhage proceeds from it; and this I have done repeatedly, without any unfavourable results, where the vessel has been sound. I have also tied the vein in sloughing gangrenous sores, without any inconvenience; indeed, were they so constantly affected by inflammation, venesection itself would be a very dangerous operation.

the usual symptoms of deranged biliary functions have appeared before death, where the liver has been its seat. Of the cure of cases of this nature I can say nothing satisfactory.

3. *Diseases of the bones, or of the joint close to the amputated part.* These admit of the easiest recognition in the living subject, and are various in extent and degree, and when not proceeding to the last stage, or not having superinduced great general debility, they may be in some measure alleviated. They are always attended with inflammation, and separation of the periosteum, although in some cases the cicatrix remains sound over the end of the stump; and it is only after a separation of the soft parts, in consequence of an abscess or ulceration, that the bone is found denuded for various lengths, sometimes close up to a joint, and lying an extraneous body in the centre of the muscular mass, exciting and keeping up a degree of irritable fever, which but too often proves fatal. Nature makes great exertions to remove the diseased bone; and, aided by gentle means, often succeeds if the constitution is sound. The absorption is always made in irregular lines, the division of the bone is never completely circular, but has the appearance of being splintered; sometimes this denticulation takes place all round the shaft, at others only partially; but in all, absorption seems to have been as powerfully exerted within the canal of the bone, as on its external surface, giving both surfaces a worm-eaten or perforated appearance. I have removed pieces of bone of six or eight inches long thus eroded, and smaller pieces of a ring-like form are very common. The contrast between them and the bone of a sound stump is curious; in the latter the bone is plump, exquisitely rounded, and the hole leading to the medullary canal, small, and covered with a fine pellicle; the cancelli beneath entire. In the other, the bone is wasted and discoloured; the sawed end flat as when the instrument was first applied; the orifice wide, and without any membranous covering, and the cancelli destroyed. The same contrasted appearances take place where there are two bones in the limb. These in the sound state of the stump are united by callus, and rounded off by the action of the absorbents. In some instances, the original diseased bone is sheathed in a new-formed osseous sponge, extending considerably beyond it in all directions, and producing a foul, painful, and irritable, sore. This luxuriant bony growth is almost peculiar to man; in the accidental injuries of brutes it is scarcely to be seen; and it is therefore reasonable to attribute much of its production to the injudicious application of bandages and pressure. After these exfoliations are removed from the ends of the bones, the absorbents again commence their modelling action, and the extremity is smoothed and rounded, and the medullary canal is closed, as has been already mentioned, but the

end of the bone does not acquire any enlargement of size. In sound habits, this process of exfoliation is not renewed, but in diseased persons, and in crowded hospitals, it is occasionally repeated. Death, however, but too often puts a period to the efforts of nature, the patient sinking under the severity of his pain, and the violent hectic and night sweats.

I shall conclude this interesting subject by some striking cases, selected from a large number of a similar kind.

CASE XXXIV.

Death after Amputation from Disease of the Lungs.

Chatclot, a French soldier, was admitted into the hospital on the 20th of April, 1815, with an inflamed and gleeting stump below the knee; the general health was greatly affected. He complained of a short tickling cough, attended with the expectoration of gross matter; his breathing was hurried; and, on taking a full inspiration, pain was excited in the breast; the pulse quick, with increased heat of surface; the tongue white, but moist; the appetite good; the bowels loose. About eight days before his death, the symptoms became much aggravated, particularly the difficulty of breathing and cough, which was hard and distressing; the pulse was increased in rapidity and hardness, with great heat of surface. To relieve these symptoms, he was bled, and a large blister was applied to his breast; these, however, procured very slight if any relief; he got gradually worse, and he fell a victim on the morning of the 13th September. On opening the cavity of the thorax, a considerable quantity of fetid gas issued from both sacs of the pleura with great force. The lungs were found very much collapsed, and almost floating in serum. In the right cavity the effused fluid amounted to nearly a pint. It was turbid, and there floated on it a great number of yellow flakes, resembling those which are discharged from scrofulous abscesses. There were no preternatural adhesions between the lung on this side and the pleura: its colour was very dark, and its whole substance was crowded with small tubercles about the size of garden peas. These bodies were of a gray colour and firm consistence, nearly resembling indurated lymphatic glands. The lower part of the left lung both to the touch and to the eye, appeared quite healthy; towards its root a number of tubercles were felt, on cutting into which yellow pus was found. Between this lung and the pleura there existed a few slight adhesions. The quantity of fluid in this side of the thorax was about three-fourths of a pint. It was more transparent than that in the other, and no flakes of matter floated in it. Three or

four ounces of effused serum were found in the pericardium; it was quite transparent, and contained a considerable quantity of gelatinous matter, yellowish in colour, transparent, and of the consistence of the coagulum of healthy blood. The internal surface of the pericardium was rather more vascular than usual; there existed no preternatural adhesions between it and the heart. The heart itself was natural in size and appearance, excepting that its veins were rather turgid. No other peculiar symptoms were observed.

CASE XXXV.

Death after Amputation from Disease of the Liver.

“Captain C——, 12th Portuguese infantry, had his left thigh amputated to rescue him from the consequences of hectic fever and profuse suppuration, from a compound fracture of both bones of the leg by gunshot, received at the battle of Toulouse. The hectic was arrested, and every thing went on well for nine days after the operation, when he was seized with violent difficulty of breathing, and frequent irregular attacks of rigor, without being able to refer to any particular part as the seat of pain. On the 4th day from this attack, he unexpectedly expired. Some illiberal reflections having been thrown out against the operator in this case, I examined the stump minutely after death, and found every thing connected with the operation perfectly right. There was a remarkable fulness observable in the right hypochondrium, which was accounted for on opening the abdomen, by the appearance of an immense abscess, occupying all the superior part of the great lobe of the liver, which had discharged a portion of its contained pus through the diaphragm into the thorax. Captain C—— never complained of pain in this region, and for nine days subsequent to the operation seemed only to labour under rapidly increasing debility. He was a healthy man, and of regularly temperate habits.*

CASE XXXVI.

Death after Amputation from Disease of the Lungs, and a Collection of Matter in the Hip-joint.

Michael M——, 3d regiment of guards, had the right lower extremity amputated below the knee, on the 11th of July, 1815,

* Communicated by Staff-surgeon Hughes.

in the Jesuits' hospital, at Brussels. On the 18th the stump became very painful, and his bowels were costive. On the 27th, inflammatory fever set in, which assumed a remittent form, but by the 29th became continued and much aggravated in violence. Bark, which had previously been employed, was now left off, and the heat of skin being great, he was sponged with vinegar and cold water, which soon lowered its temperature. During these appearances of general disease, the stump assumed an unhealthy appearance; and on one day slight hemorrhage took place—a bed sore also formed on his back. By the 1st of August, the febrile symptoms became very severe. Delirium took place, attended with great prostration of strength, and he died on the 3d. The body was inspected on the afternoon of his death, and the following appearances were reported to me by Hospital-assistant Nichol. In the thorax, extensive adhesions were observed between the pleura costalis and pulmonalis. The right lung seemed perfectly sound; but on the posterior part of the left lobe, several tubercles were observable in a state of suppuration, and a greater than usual quantity of fluid was found within the pericardium. The abdominal viscera all appeared sound. On making an incision over the hip-joint of the right side, a considerable collection of matter was discovered around the trochanter major, chiefly external to the capsular ligament. The trochanter at one point was denuded of its periosteum. The synovia of the joint was changed in appearance, having a dark yellowish tinge. These diseased appearances had no communication whatever with the stump.

Nature sometimes effects a cure by the discharge of this matter, collected in or near the joints, but it frequently remains unnoticed until death, although, in some cases, an obscure diffused kind of swelling gives room to suspect its formation, and suggests the propriety of topical blistering and venesection.

The following case, furnished me by Assistant staff-surgeon Blackadder, is very illustrative of some of the circumstances attending field amputation, and the combination of causes, tending to produce the fatal event.

CASE XXXVII.

Death after Amputation from Inflamed Veins, where no Ligatures were applied.

“ B. J., aged twenty, was wounded on the 18th of June, 1815, and admitted into the Gens d'armerie hospital on the 30th. A cannon-ball had carried away the left leg, and the stump had been amputated on the field. He stated, that, at the moment

of the operation, the French were obliged to retreat, and that the surgeon, on that account, not taking time to secure the blood vessels by ligatures, merely applied a large cushion of charpie, along with a bandage, and then left him to his fate. He also stated, that for several days he had nothing to eat or drink, and that the stump had not been dressed till ten days after the operation had been performed. When admitted into the hospital, the granulations had a clear but somewhat bleached or boiled appearance. The bone protruded about an inch, and had become black at its extremity, and he complained of increased sensibility and pain in the stump, particularly on moving or touching it in the operation of dressing. His pulse was quick, small, and sharp; his skin hot and dry; his appetite bad; his belly costive; and his tongue covered with a white mucus, somewhat yellow towards the base.

“Laxatives, followed by diaphoretics, were administered, and the latter persevered in for several days without any mitigation of the febrile symptoms; the stump became daily more painful, but without swelling or inflammation; the granulations retaining their peculiar white glistening and indolent appearance. At length, the skin became moist, and his pulse softer and less frequent, but the irritability of the system was evidently increased, accompanied by a disposition to spasmodic action in the muscles, particularly those of the face. On the 22d July, he became suddenly very uneasy and restless, and died on the morning of the 23d. Upon examination after death, the femoral vein was found ulcerated at its cut extremity; all the large *veins* of the stump were found to have been inflamed; they were remarkably vascular, and their coats very much thickened. Unfortunately, from the great pressure of duty, the state of the *vena cava* was not examined. There could be little doubt, however, that the inflammation had extended to the heart.

“There was a small collection of matter on the outer surface of the femur, and also in the substance of the bone near its cut extremity, where there was a considerable deposition of bone in the form of sharp spicula, pointing toward the trunk of the body, but no marks of commencing separation of the dead from the sound parts.”

After a successful amputation the parts gradually close over the end of the stump; after some time, the end of the bone is found to be somewhat enlarged, and is finely rounded off by the action of the absorbents. The cavity of the medullary canal is somewhat contracted, and is covered over with a delicate membranous expansion, from which the medulla is a little withdrawn; in process of time the orifice is more firmly closed with a cartilaginous matter,—and in some cases it is entirely obliterated by perfectly formed bone. Where two bones are divided,

they are generally cemented together by osseous matter thrown out from each, and the two being thus formed into one, become rounded off as if they had been originally but one bone; but they never present the same smooth appearance as the stump of a limb, where only one bone has been sawn through. In some cases the junction is formed by cartilaginous matter, and the bones are separately rounded off, and become as smooth as where one bone only is divided.

CHAPTER XVI.

INJURIES OF PARTICULAR PARTS.

WOUNDS OF THE HEAD.

IF the complications in the symptoms of injuries of the head, as they occur in civil life, are of a nature so serious as to have employed the attention and the pens of some of the greatest ornaments of our profession; it may well be imagined how infinitely aggravated they become, when they happen on the field of battle, where the projectile force of the inflicting body is so vastly greater than on ordinary occasions, and the aid of surgery so much later in its application. Fortunately, however, injuries of this description form by far the smallest number of the cases which a great battle produces. It may be stated generally, that one half of the injuries of the head are left dead on the field, or die before assistance can be afforded; but all correct calculations on this subject are totally impossible. In sieges, where the troops are exposed in the trenches to the fire of the enemy placed several feet above them, the number of wounds of the head will naturally be increased; and in cavalry attacks, where the weapon hitherto most generally used, the sabre, is so particularly directed against the head, they will also more frequently appear, though certainly under a less aggravated form than in infantry encounters.

The young surgeon, who, for the first time, witnesses a series of injuries of this description, will at every step have something to unlearn; he will find symptoms so complicated, contradictory, and insufficient to give any rational clue to their causes; diagnostics, of the truth of which he had read himself into a conviction, so totally unsupported by the results of practice; and the sympathies he was led to look for as infallible accompaniments of certain states of disease, so often wanting altogether, that he will probably be inclined to relinquish the hope of ever arriving at a correct theory, or, at least, he will enter the clinical ward with the pride of science considerably subdued.

I offer the few following observations, merely as illustrative of some leading points of the general doctrine in a class of injuries, exceeded by none in the extensive range of the profession for interest and importance, and on which volumes might be composed without exhausting the subject, or fully elucidating it. I do not question the propriety of the ordinary division of injuries of the head into those of the containing parts and those of the parts contained; into the effects of concussion and the effects of compression;—but excessive refinements in distinguishing these injuries and their varieties, I conceive to be very unnecessary to the practical surgeon; they often, nay, most frequently, are coexistent; and if, in the treatment, the surgeon makes the prevention or subduing of inflammation his great end and aim, he does nearly all in the first stages that is within the reach of his art.

To effect this desirable object, nothing should be omitted in serious injuries of the parts, (and who has not seen apparently the most simple terminate seriously?) to remove every source of irritation. We now-a-days, it is true, do not cut away the injured scalp, or procure artificial exfoliation of the uncovered bone; but I certainly think we but too often omit making ourselves perfectly acquainted with their state, by being content with a superficial incision, and clipping the hair surrounding an injury, instead of a free opening, and shaving to a sufficient extent, as practised by our forefathers. Independent of the more accurate view we procure by these means, we facilitate the application of leeches, if they may be found necessary, and of a most excellent adjuvant on all occasions, viz. cold applications, which are ever soothing to the patient, and often materially assistant to his recovery. The formula recommended by Schmucker is nitre sixteen ounces, muriate of ammonia eight ounces, dissolved in forty pounds of cold water, with the addition of eight pounds of vinegar. To avail ourselves of the full frigoric effects of this mixture, it should be prepared in small quantities, and used immediately before its temperature, (which is greatly depressed by the act of solution,) has risen to that of the

surrounding atmosphere. Snow, or pounded ice, or ice water, applied to the parts in a half filled bladder, or cloths simply dipped in cold water, will often answer every purpose.

I think also that I have observed a much less frequent use of the very powerful auxiliary of nauseating doses of antimonials than their utility warrants; and, although I would not go so far as Desault and other French surgeons have done in the recommendation of them, I certainly am of opinion that, in the British military hospitals, they have not generally met the attention they are entitled to. By the employment of these external and internal means; by the use of mild saline purgatives, preceded by the common blue pill; by quiet, and by abstinence, we will often prevent altogether those troublesome puffy enlargements and erysipelatous affections of the scalp, which so often succeed to bruises. And I may here observe, that those extensive and formidable erysipelatous affections, so common formerly, are rare and mild at present in military hospitals, where the evacuant plan is duly observed, and cleanliness and ventilation properly attended to; while in the civil establishments, the affections of the skin in acute diseases are also most remarkably diminished.*

The injuries of the head, which more commonly come under the notice of the military surgeon, may be conveniently divided into, 1st, Simple bayonet and pike thrusts, and sabre cuts; 2^d, The same, complicated with fractures; 3^d, Simple gunshot wounds and contusions, without fracture; 4th, The same, complicated with fracture, and with the lodgement of extraneous bodies. In all these cases, the general principles of surgery are equally applicable as in the accidents of civil life, and, except the fourth, present little unusual; on this, therefore, I shall principally enlarge, first making a few remarks on the preceding classes.

In bayonet thrusts of the integuments, which frequently are extensive, judicious incisions, so as to leave a free space for the tumefaction of the scalp that almost always succeeds, should be employed along with the general means just mentioned. Perforations of the bone from bayonet thrusts are rare, and generally fatal, but whenever the patient survives, their mechanical treatment will consist merely in extracting spicula of bone, and elevating any depression that may occur. Where bayonet or pike thrusts take place in the orbits, temples, or through the roof of the mouth, or the occipital foramen,† into the base of the brain, they are most generally fatal; indeed, those through the orbit and base of the cranium are almost invariably so.

* See Willan on Cutaneous Diseases, Ord. 3, Genus Purpura, p. 468.

† Ravatot gives a case of this latter kind, p. 421.

While arrows formed one of the principal weapons of warfare, these accidents were much more common than at present, but now the thrust of the bayonet, or pike, is generally made at the breast or belly, in a straight forward direction, and those which take place in the head are obliquely upwards, as in the wounds inflicted by infantry upon cavalry, or directly downwards, as in infantry or lancers thrusting at a prostrate enemy. Ambrose Paré gives us the case of Francis of Lorraine, Duke of Guise, who was wounded before Boulogne by a lance, which struck him above the right eye inclining towards the nose, and which entered and passed through on the other side between the neck and the ear, with such violence, that the head of the lance and a great part of the wood were broken, and remained in, and could not be removed without the aid of a farrier's pincers. "Notwithstanding all this violence," says Paré, "which was not done without breaking of bones, nerves, and arteries, and other parts, my said lord, by the help of God, was cured."*

In cases where the instrument breaks, the trephine is often had recourse to with advantage, of which we have two very striking instances in writers on military surgery, one by Desportes, where a pointed piece of wood was thus removed with perfect success;† the other in the excellent little work of Baron Percy, in which the blade of a knife was extracted in the same manner and with equal success.‡ But the most remarkable wound from a sharp pointed instrument with which I am acquainted is one quoted by Briot;§ it is as follows: At the battle of Pultuska, in Poland, a soldier was wounded by a bayonet, which had been fixed, but was dismounted and propelled forward by a ball. The bayonet entered the right temple two inches above the orbit, it inclined backwards and downwards, and traversed the maxillary sinus of the opposite side, where it passed out, and projected above five inches, having penetrated to the hilt. The patient and two of his comrades tried in vain to extract the instrument. The surgeon-major, M. Fardeau, repeated the same attempts on the field, but without success. A soldier, who assisted, thought himself stronger than the others, and seating the patient on the ground, placed one foot against his head, and with both hands disengaged and extracted the bayonet. A considerable hemorrhage followed, and the patient fainted. M. Fardeau, who believed him dead, or dying, left him to attend to others of the

* Lib. 29. *The Voyage of Boulogne*, 1545.

† *Traité des Plaies d'Armes a feu*, Paris, 1749, p. 374, Obs. 25.

‡ *Manuel du Chirurgien d'Armee*, p. 101.

§ *Histoire de l'Etat et des Progrès de la Chirurgie Militaire en France*, pendant les Guerres de la Révolution, 8vo. à Besançon, 1817. The case is quoted from the *Journ. de Med.* tom. xxxv. p. 387.

wounded; he revived, however, the wound was dressed, and he travelled partly on foot, and partly on horseback and in waggons, to Warsaw, twenty leagues from the field of battle. Three months after M. Fardeau saw him perfectly cured, but with the loss of the right eye, the pupil of which was immoveable, and much dilated.

Sabre cuts admit frequently of being at once replaced, and in many instances with the aid of a few stitches, and proper supporting bandage, they adhere without farther trouble. In some, inflicted by our own and the French dragoons in Spain and Belgium, sections of the scalp, cranium, and even of the brain, were frequently made, and in many instances were successfully treated by simply laying the parts together.

Where a large portion of bone is removed from the cranium by a wound or operation, nature supplies its place by a tough ligamentous membrane, and if the teguments have been preserved, and judiciously applied over the wound, the vital organ beneath is sufficiently protected. Osseous matter is also thrown out from the edges of the wounded bone, and if these edges come in contact a perfect union is effected; thus we often meet with a slice of bone overlapping the vault of the cranium, and firmly adhering to it; in these cases the separated portion had not been properly replaced in its original situation, or it may have been dragged from it by the action of the muscular fibres attached to it.

It is worthy of remark, that the sabre wounds on the top of the head are not by any means so dangerous as those on the sides; this I have often had occasion to observe in my own practice, as well as from the reports of others. In some sabre wounds which divide the skull across the sagittal suture, the longitudinal sinus has been occasionally opened and bled profusely,* but without inducing fatal consequences. I have seen this sinus opened by splinters, but never saw any thing approaching to dangerous hemorrhage from it, in truth, the bleeding from wounds of the head is one principal source of the patient's safety. No ligature is required to the arteries of the integuments of the head, pressure against the bone being quite sufficient to command the hemorrhage from them; and indeed, ligatures and sutures of all kinds should be used as sparingly as possible to the scalp, as they are frequently found to induce erysipelatous inflammation and sloughing of the parts.

In simple gunshot wounds not penetrating the cranium, the sloughs are sometimes very tedious in throwing off, and will

* Ravatot, p. 545. Lamotte gives a case where, by the stroke of a dragoon's sabre, the skull was deeply cleft, the right parietal bone to the depth of two inches, and the left to between three and four nearly down to the ear. This severe wound was cured in less than three months.

require a warm emollient poultice or two, instead of the cold applications. I have known numerous instances where no serious injury has followed them, although they grazed the bone; but it must be admitted that they often give rise to subsequent inflammation, suppuration, and all the dangers of compression; to obviate this, the French surgeons are much in the habit of making an incision down to the bone in all cases of gunshot wound of the integuments of the head, in order to ascertain the state of the pericranium; if this membrane is either detached or discoloured, they immediately trepan. That many soldiers have survived the trepan thus applied, I have no doubt; but I am equally certain that it is quite unnecessary in the first instance, however urgently it may be called for, if symptoms of compression from purulent depositions should subsequently occur; but proper treatment may frequently obviate these depositions; and it can never be too often repeated to the young surgeon, that by the lancet, purgatives, cold applications to the part, and rigid abstinence, he may prevent infinitely more fatal events, than he ever can by the most dexterous application of the trephine or the saw.

Fractures from gunshot are almost universally of the compound kind, and are rarely unaccompanied with great depression of the skull. The difficulties of elevating or extracting the depressed portions of bone beat in upon the brain by gunshot, or the extraneous matter carried into its substance, are often very embarrassing; the ball, from the projectile force communicated to it, not only fracturing the bone, but hurrying in with it the detached piece or pieces, and jamming them under or amongst the sound parts: frequently, also, it lodges among the fractured portions; frequently it imbeds itself between the more solid osseous plates, and forms a kind of nidus in the diplöe; and sometimes it drives forward into the brain itself, eluding the search of the surgeon, and subverting the theories of the physiologist. In the majority of cases, a leaden ball is either flattened against the bone, or, if it has struck obliquely, it is cut against the unshattered edge of the cranium; and is either simply jagged; or is divided into two or more distinct parts, forming with each other various angles, influenced in their acuteness by the projectile force, the distance, obliquity, &c. &c.

It not unfrequently happens, that a perfect division of the ball takes place; and the two distinct masses lodge, or one lodges and the other flies off, or else it takes its course through a different set of parts, or imbeds itself in a different spot from that where it originally struck. In all these cases, the removal of extraneous matters, the extraction of the fractured portions, if they lie loose, and the elevation of the depressions, where it can be done without the infliction of additional violence, are, of

course, the first steps to be taken; but instances (particularly on the field) will occur, where this cannot be done. The grand and leading point to be kept in view, in all cases, is the great tendency of the brain and its membranes to inflammation; the uncertain period at which it may occur; and the very doubtful consequences which may succeed its occurrence. So irregular, however, and as it were, so capricious is nature, that, while the slightest causes produce inflammation in its most violent and aggravated forms, extensive injuries, fracture, depression, and even permanent compression from lodgement of balls, have been followed by no such consequences. In the following case, the injury to the brain, and the extinction of existence, were contemporaneous.

CASE XXXVIII.

Instant Death from Injury of the Brain.

In May 1804, in a squabble between two soldiers, one of them, who was sitting on the side of his bed cleaning the barrel of his musket with his ramrod, was struck at by the other. He raised the ramrod to deter the man from prosecuting his blow. The unfortunate fellow, however, slipt in the act of striking, and received the point of the ramrod just above the root of the nasal process of the frontal bone, and instantly dropped dead. Staff-surgeon Hughes, who examined the head in the presence of a coroner's inquest, found, that the iron had entered obliquely, running a little towards the left side, slanting upward, and penetrating the anterior lobe of the left hemisphere of the cerebrum to the depth of an inch. There was no effusion of any kind, nor any unnatural appearance, except the hole made by the weapon.

With this case, it may be well to compare that very remarkable one mentioned by M. Larrey,* in which the patient survived to the second day, where a ramrod had actually passed through the os frontis; between the hemispheres of the cerebrum; through the thick part of the sphenoidal bone; and through the condyloid foramen of the occipital bone, without injuring any important organ. The preservation of this skull in the collection of the faculty of Paris places the fact beyond question.

The instances of death, after the setting in of inflammation

* See *Memoires*, vol. iii. with a Plate. Compare also a case by *Curtis*, on the Diseases of India, p. 254, where a boy ran on an iron spike, and lived for twenty-six days without much apparent injury. See a remarkable case in the 13th vol. of the *Medico-Chirurgical Transactions*, by Dr. Rogers, where the breach pin of a gun was removed from the brain; it was three inches in length, and weighed exactly three ounces.

from very trifling causes, are of almost daily occurrence, and would induce us to anticipate its certainty after all violent injuries; but it is a great mistake, now acknowledged by the best surgeons, to suppose that every depression requires an elevator, and every fracture the interference of art; although it is a common one, fallen into by the juniors; and even among the older class I have seen operations attempted on very unnecessary occasions. The following case illustrates this point:

CASE XXXIX.

Fracture, with Depression, not Trepanned.

Corporal J. Cockeyne, 33d regiment, received a wound from a musket ball at Waterloo, which struck the right parietal bone at its junction with the occipital, close upon the union of the lambdoidal and sagittal sutures, and fractured the bone to an extent exactly corresponding with its own size. The ball was split into two portions, forming nearly right angles. It was easily removed, but from the narrowness of the passage, and from the depth to which the fractured portion of bone had been driven into the brain, (being exactly an inch and one-fourth from the surface of the scalp,) no operation was performed on the field; and, as no one bad symptom occurred in the hospital, I did not allow the wound to be meddled with there, although much and frequently solicited by some of my medical friends. I trusted to venesection, a most rigid abstinence, open bowels, and mild easy dressings. On the 14th July, or 26th day, the wound was nearly closed, without any one untoward symptom, and the functions were in every respect natural. In a few weeks after, the man was discharged cured.

In a similar case, where the man survived thirteen years, with no other inconvenience than occasional determination to the head on hard drinking, a funnel-like depression, to the depth of an inch and half, was formed in the vertex. I am in possession of several other instances of a similar kind.

We have here sufficient proof that there is no absolute necessity for trepanning merely for depressed bones from gunshot, although few would be so hardy as not to remove all fragments that come easily and readily away. We would also naturally remove all extraneous bodies within view or reach; but before we commence any unguided search after them, we ought seriously to balance the injury that we may inflict. I by no means wish to be understood to say, that we ought not to endeavour cautiously to follow the course of a ball, when unfortunately it has got within the cavity of the cranium. M. Larrey asserts,

that it can be done with safety and with effect. He informs us, that he traced a ball which entered the frontal sinus of a soldier during the insurrection at Cairo, by means of an elastic bougie, from the orifice to the occipital suture, in the direct course of the longitudinal sinus; and by a corresponding measurement externally, he was enabled successfully to apply a trepan over it and extract it. The patient recovered. M. Percy, on the other hand, gives us a fatal instance where a ball was absolutely within reach of the forceps, and yet for want of a sufficient opening, and manual dexterity in the operator, it slipped into the brain; and although the opening was enlarged by the trepan, it could not be recovered. In the works of some of the older authors, we meet with cases where epilepsy and various other bad symptoms have followed the attempts at extracting arrows and other missiles sticking in the brain; and in more modern practice there are many instances where patients have lain in a state of apoplectic stertor, with a ball lodged in the brain for some time, but have expired on its removal. One instance of this kind has been reported to me, where a soldier died in the very moment that the ball was extracted. A modern surgeon would be severely and justly censured for not at least making a trial; but we are encouraged to look for the eventual safety of our patients, when the course or actual site of the ball or other body is unknown, by recorded and well-authenticated instances of life being preserved, when they either have not been looked after, or their existence has not been suspected.

The records of surgery furnish us with many proofs of metallic and other bodies lying for long periods between the cranium and dura mater; but experience shows, that the extraneous bodies may lie even in the brain itself without producing death.* I have seen no less than five cases where a ball has lodged in the substance of the cerebrum, without immediately producing a fatal event. The following curious and instructive case was furnished me by Assistant staff-surgeon Blackadder:

CASE XL.

Ball extracted from the Brain.

“ D. M. aged 27, a soldier in the service of Bonaparte, was wounded on the 18th June, 1815. After lying three days on

* In the “*Memoires de l'Academie Royale de Chirurgie*,” tom. i. p. 310, folio edition, is a most interesting paper by M. Quesnay, on wounds of the brain, extremely well worth consulting, in which he has amassed a number of cases of this description. The catalogue might be very easily enlarged, and may be seen at great length in the references of Ploucquet, in his learned and laborious “*Literatura Medica Digesta*,” &c. *Tubingen*, 1809.

the field without tasting food of any description, he was taken to a village, and afterwards to one of the churches of Brussels, without any thing having been done for his wound. On the 30th, I sent him, with many others, to the Gens d'armerie Hospital, and on the 4th July, he was placed under my immediate care.

"A musket ball had entered at the anterior portion of the squamous suture of the right temporal bone, and, passing backwards and downwards, fractured in its course the parietal bone, and lodged itself in the substance of the brain. There was a considerable degree of tumefaction of the soft parts surrounding the wound, but, with the exception of a slight headache, and partial deafness of the right ear, he seemed to enjoy perfect health. He slept well, his appetite was good, his belly open, his tongue clean, his skin cool, and his pulse 72 of natural strength.

"On the morning of the 5th, the wound was laid freely open, when three large and several small pieces of bone were removed; and the ball which was found lodged in the posterior lobe of the right hemisphere of the brain, where it rests on the tentorium, was extracted without difficulty, and with small portions of the substance of the brain adhering to it.

"After the wound had been carefully cleared of blood and small pieces of the brain, its lips were brought together and retained by two ligatures, along with adhesive straps, compress, and bandage. His whole head was kept constantly wet with cold water, a brisk purgative was administered, and he was placed on a very spare diet, with a small allowance of ripe fruit.

"Under this management (a laxative being daily administered) he continued free from pain, or any derangement of the system, until the 16th, when he complained of lancinating pains through the back part of his head, of uneasiness from the light of a candle, and from noise. The wound looked remarkably healthy, with only a small discharge of healthy pus, and all that part which had been laid open by the knife was united. The pulsation of the brain could be readily discovered at two different points, where the large pieces of bone had been extracted. A brisk cathartic speedily removed these untoward symptoms, which there was reason to believe, had been produced by some of his fellow patients having indulged him with part of their allowance of food, the impropriety of which was distinctly explained, and means used to prevent the repetition of a similar irregularity. This, however, was no easy matter, as his appetite was keen, and he was confined to a very spare diet, viz. a small allowance of bread, with water whitened with milk, and sweetened with sugar.

"He now continued to enjoy his former good health, and nothing particular occurred till the 24th, when, on going my usual rounds, betwixt 10 and 12 o'clock, P. M. he called me, and said he was not well; the expression of his eyes was new and peculiar; and, along with the fulness of his countenance, evidently indicated a great and general irritation of the system. His pulse was, for the first time, 96, and hard; his skin hot and dry; along with a degree of stupor, and disposition to sleep. Upon making inquiry, I found that the medical officer (a young gentleman who had recently entered the service) under whose care he had been placed for the last four days, had omitted to give him his usual laxative, and instead thereof, had that day allowed him *wine*, an *egg*, and other *extra articles*.

"A brisk cathartic was again immediately had recourse to, and after its operation a diaphoretic mixture, which, with a rigid adherence to his former mode of treatment, soon restored him to his previous state of convalescence.

"On the 5th of August, when I saw him for the last time, his wound was cicatrized. The pulsation of the brain was still visible, but, with the exception of a slight degree of giddiness on stooping, he enjoyed perfect health. This he expressed, by saying, that from his sensations he could not know that he had ever been wounded. It is proper to add, that, during the time of the above cure, he was allowed to smoke tobacco whenever he felt inclined, and which was almost constantly. It was never observed to produce any bad effect, and he argued the necessity of using it by saying, that it mitigated the otherwise almost irresistible urgency of his appetite, and thereby enabled him the more easily to comply with the very restricted regimen that was enjoined him, and which, as he was at length convinced, was essential to his recovery."

In the following case, the heads of which I received from Staff-surgeon Halkett, it is difficult to say to what period life might have been protracted.

CASE XLI.

Ball lodged in the Brain.

A soldier of the 8th regiment of infantry was shot in the head during the late Canadian campaign. A fracture was the consequence, with a depression of not less than an inch and half, but, as no untoward symptom occurred, no operation was had recourse to. This man recovered, and went to the rear, where, at a distance of several weeks afterwards he got an attack of phrenitis from excessive drinking, and died. As the existence

of the ball in the brain was strongly suspected, an inquiry was made after death, and, on dissection, it was found lodged in the corpus callosum.

A very curious and interesting observation of this kind is given us by Quesnay:—A Brigadier, in the service of the French King, received a musket shot above the eye-brow; he was sufficiently recovered to return to his duty in the field the ensuing year, where he died, as it was supposed, of a *coup de soleil*. On opening his head, however, the ball was found to have penetrated two fingers' breadth into the brain, where it lodged without giving rise to any morbid symptoms. M. Anel gives another case, quoted by M. Quesnay, in which a ball had fractured the frontal bone, and lodged in the brain. The wounded man was cured, and the ball remained for many years in his head, without giving him any inconvenience. At last he died suddenly, while playing a game of cards. The surgeons who had attended him opened his head, and found the ball lying upon the pineal gland, along with some recently effused coagulated blood.

M. Martiniere presented to the French Academy of Surgery an invalid, in whom a small fistulous sinus existed in the lower part of the frontal bone, occasioned by a wound from a musket ball which had not been extracted. During the cure of this wound, many exfoliations were detached from the internal table of the bone; the route of the ball could be easily traced with the probe along the sinus, but its exact site could not be discovered; and at length, after a variety of accidents, as fever, stupor, delirium, &c. on the 27th day, the patient appearing out of danger, the wound was allowed to heal, the ball still remaining within, and a small sinus alone marking the seat of the injury.

The following case is one of more recent occurrence, and the individual may probably be alive at this moment:

CASE XLII.

Ball lodged in the Brain.

Favre, a Chasseur of the imperial Guard of Napoleon, who had fought at Borodina, distinguished himself most gallantly on the field of Waterloo. No mounted British soldier was enabled to unhorse him on that day: but he at length fell amid a shower of musket-balls, one of which penetrated his left temple at the junction of the three sutures. With the symptoms which immediately followed I am not acquainted, but, from the history given by Favre himself to the medical officers in attendance, Staff-surgeon Laisne, and my friend Dr. Knox, who favoured

me with the heads of the case, it was obvious that he had lain insensible for three days and nights, and that violent inflammation had taken place before he was brought into the British hospital.* The entrance of the ball, and its course within the brain, were very evident to the eye and probe. In October, four months after the battle, this man was alive, and, without any constitutional injury, or disturbance of any one function, was performing the part of an assistant and orderly to his less fortunate comrades. A small suppurating sore, but discharging moderately, then remained in the site of the wound, and he felt occasionally some giddiness and headach. Favre, like many other people, was not content with his good fortune, but wished *something to be done for him*, and prevailed upon a young man to apply a bit of caustic to his wound, to remove a small papilla of fungous flesh, and dry up the discharge. Severe pain and corded feeling of the head, with hot and dry skin, bounding pulse, suppression of discharge from the wound, and in short, every symptom of alarming fever, soon made their appearance, and this at a period when low fever and erysipelatous inflammation spread over every wound in the hospital, and rendered the use of the lancet questionable, if not hopeless. However, by means of steady purging, and other active measures, he recovered in four days, leaving an impressive example of the danger of ignorant interference. He returned to France with his recovered comrades shortly afterwards. Before he left the hospital, the vision of the eye on the wounded side began to fail, and, to an accurate observer, the power of the muscles of the eye and of its lid, particularly the levator, appeared to be impaired. In expressing his gratitude to his attendants for their humanity, and for the perfect cure he owed to their attention, he observed, "so little inconvenience did he feel, that, could it benefit the Emperor, he would willingly receive a ball in the other side!!"†

This lodgement of balls does not destroy the restorative powers of nature, as the fractured and separated pieces of bone often make a considerable progress towards perfect reunion in the same way as we have already seen them do after sabre cuts. Mr. Hammick, surgeon of Plymouth Royal Naval Hospital, has a very remarkable preparation illustrative of this fact. A large part of the frontal bone, nearly four inches in circumference, including the superciliary ridge and subjacent frontal sinus, is car-

* The Gens d'armerie at Brussels, Division 1.

† A very interesting case of this kind is given by Mr. Kirby in the Dublin Hospital Reports, vol. ii. p. 303. In the Bulletin de la Faculte de Medecine, No. 10, for 1812, M. Langlet gives a case where a seven drachm ball remained for 18 months in the brain, a fact the more curious, that a sort of membranous envelope connected with the dura mater was thrown around it; by this singular disposition, the ball was in some measure suspended in the purulent matter which surrounded it.

ried outward and overlaps the temporal fossa; the bony union is nearly complete; while a musket ball is lodged deep in the anterior lobe of the brain. The man from whom the preparation was taken was wounded in Spain, and died at the distance of two months after in Plymouth.

Lodgement of balls, and great depression of the bones, will often exist unsuspected and unnoticed for days, until an inflammatory disposition is excited by some errors of diet, or other accidental occurrence, when all the symptoms burst forth at once. The following case illustrates this:—

CASE XLIII.

Extensive Fracture, Ball lodged.

A soldier of the light company of the 79th regiment was wounded at the battle of Quatre Bras, on the 16th June, 1815, on the posterior part of the occipital bone, inclining towards the right side. He could not tell by what weapon, nor did he immediately perceive the accident; it was only after retiring about a hundred paces, that, on the information of his comrade, he discovered he was at all injured; and presently after he got faint from the loss of blood, and experienced great sickness of stomach. He lay on the field that night, vomiting occasionally, but without being able to sleep. He was removed by the peasants next morning to an adjoining barn, but was neither bled nor purged; a dressing being simply applied to the part. The succeeding day he was removed six miles on the road to Brussels, and placed in a barn with other wounded, where he was attended by a Prussian surgeon, who did no more than apply some lint and a roller. Here he remained for nine days, till he was removed to Brussels, during which period he felt excessive pain in his head, with great dimness of sight and loss of memory. The vomiting, however, had ceased, but he had had no stool for twelve days. He went to his old billet, and was for five days attended regularly there by two civil practitioners, who dressed the wound, and administered occasional purgatives. He improved in strength, but still complained of vertigo and giddiness: his appetite declined, (notwithstanding that his kind host gave him what he called *strengthening* articles of diet;) his thirst was urgent, but he drank no wine from the evening of his wound, except about a pint given him in the barn by the country people.

On the 7th of July, or the nineteenth day, he was received into hospital at Brussels, and placed under the care of Staff-surgeon Hill, with whom I had frequent opportunities of witnessing the progress of the case. The injury in the scalp was

almost perfectly healed, and looked more like a bayonet thrust than a gunshot wound. He walked about the ward apparently in good health, and only complained of slight headach. Two or three days after his admission, a very copious purulent discharge took place, together with an occurrence not unfrequent in injuries of the head, viz. a sympathetic swelling of the parotid gland of the right side, which seemed to be connected with the wound by a narrow fistulous opening. A probe entered without the smallest resistance, and to such an extent as to render it improper to push it farther; but suspicion was excited in the mind of the dresser, who, on examination, detected a fracture with depression of that part of the occiput opposite the internal transverse ridge on the right side. The man's countenance had become flushed, the thirst was urgent, and languor excessive; there was no shivering, however, nor was there any puffy tumour or surrounding inflammation.

On the 15th July, a free dilatation of the part was made, and the surface of a ball was discovered firmly impacted into the bone; when extracted, it presented a very ragged appearance, having been cut against the sound part of the bone, and one portion of it was very much elongated. The trephine was now applied by Staff-surgeon Hill, and two large pieces of bone were extracted, together with five lesser fragments, from an inch to the fourth of an inch in size. The largest portion was completely beaten into the brain, the lesser was forcibly depressed on it. The patient sat upon his bedside during the operation, his head supported on the breast of an assistant. A small quantity of blood, which seemed to spring from the basis of the skull, followed the extraction; and his pulse, which had previously been scarcely perceptible, immediately rose and felt soft, while a pain, of which he complained in the anterior part of the head, disappeared. He evinced no loss of muscular power, or parapysis, on the visit at seven o'clock in the evening. Next morning his skin was cool, his pulse 90 and soft, his thirst diminished, but he had not slept. During the day he had some slight nausea, which was relieved by lemonade. His bowels not being free, he had a solution of Epsom salts, and an allowance of some ripe fruit with his spoon diet. He slept two hours during the next night, and had some free evacuations of the bowels, with a slight degree of epistaxis. On dressing the sore, a small discharge of reddish gray serum took place, and his pulse was harder and more frequent than before. Eighteen ounces of blood were abstracted from the arm; and as the pulse, which after the bleeding had sunk, rose again about three o'clock on that day, (the third from the operation, and thirty first from the infliction of the wound,) venesection was repeated to the same extent. On tying up the arm he had a slight rigor, and

at ten at night he had another more considerable, which pained his head severely. On the succeeding day it was found that he had had another rigor in the night, with severe pain of the head, a quick but soft pulse, but no derangement of the stomach; belly costive. From this period, up to the 28th of July, he improved imperceptibly. He had some occasional irregular rigors, succeeded by profuse sweats, now and then costiveness, and sometimes severe pain in the head, all which were relieved by purgatives; but the wound went on gradually towards a cure, and only on one day did a dilatation of the pupil give any indication of the injury of the head which afterwards appeared.

On the 29th day of July, or forty-third day from the injury, a regular intermittent fever attacked him, which was treated in the usual manner. This lasted for five days, when it degenerated into a remittent form, then prevalent in the city, which also yielded to the remedies employed, and he proceeded rapidly towards convalescence, his appetite being particularly craving, until, on the sixty-third day from the wound, and forty-fourth from the operation, a fungus of the cerebrum was observed divided into two parts by a deep fissure, so as to resemble the nates; and at the same time a large tumour appeared, extending from the axilla across the inferior angle of the scapula, filled with a quantity of extremely fetid matter. No relief followed the evacuation of this; and the tumour of the brain went on increasing in size, and with strong pulsation on the surface, but with great depression, fluttering, and intermission in the pulse at the wrist, till it burst on the third day after its discovery, discharging a quantity of fluid during the night. The succeeding day he was attacked with tenesmus and occasional vomiting, and some of the cerebral substance was discharged by the wound. The day following the senses were much impaired, and he became delirious. The stools were now involuntary, and the brain continued to be discharged at the wound. He got progressively worse; his mouth became distorted towards the right, (on which side he was wounded;) his countenance was expressive of deep anguish; the discharge of the brain increased; and he expired in strong convulsions on the morning of the 23d August, the ninety-eighth day from the injury.

The dissection showed much thickening and inflammation of the dura mater; and an extensive attachment had taken place between that membrane and the cerebellum. The dura mater, all around the neighbourhood of the injury, was covered with a yellowish brown coagulable lymph, and much thickened; the pia mater did not partake much of the inflammation. About two ounces of water flowed from between the pia and dura mater, and, on cutting into the ventricle, the plexus choroides appeared much diminished in size. The fungus was formed of

the inferior and back part of the cerebrum. Two large fissures extended to the foramen magnum. In the thorax, a large collection of matter was found in the sac of the pleura, and a large abscess in the upper part of the lung of the right side. Both the lungs adhered extensively to the pleura costalis; but the external abscess in the axilla had no connexion with the purulent formation in them: it contained much fetid matter, but had no regular cyst. The heart was sound; so were the abdominal contents, except the liver, whose lower surface presented a blackish marbled appearance.

Vast quantities of the bone, and of the brain itself, are often destroyed without immediate, or even eventual, death. I have met with some cases where the upper and lateral parts of the cranium, embracing nearly the whole of the parietal bone of one side, and part of its fellow, with a portion of the frontal bone, have been fractured, and afterwards picked away, so as to expose a large share of one of the hemispheres. A soldier of the corps of Brunswick Oels met with an accident of this kind, in which nearly half the roof of the skull was blown off from the bursting of a shell, and had no untoward symptom until the 10th day, when the brain became in a fungous state, and protruded to a great extent. *He died comatose, with all the symptoms of compression.* In an officer of the —— regiment, wounded in the same action, the frontal bone was fractured by a shell, and nearly one-third of it was removed, laying bare both frontal sinuses. By the judicious treatment of Staff-surgeon Hill, although the inflammatory symptoms ran high, and temporary insanity took place, this gentleman's life was preserved. It is wonderful what efforts nature will make to cover the exposed brain or its dura mater, if not prevented by preposterous dressings. Now-a-days the scalp is never removed, but I am sure it is not always brought so far over the deficiencies in the bones of the cranium, caused by operations, or accidents, as it ought to be.

On some occasions the functions are primarily, in others only secondarily, affected. The removal of the depressed portion of bone, or of extraneous matter, is sometimes almost immediately succeeded by a relief of all the symptoms, and restoration of all the functions; in others, the restoration is more gradual, but not less effectual and permanent; while, in some, perfect relief never takes place. I have met with various instances, in which the sudden restoration has soon been succeeded by a relapse and death, while the more slow, in which no such event had been contemplated, terminated in perfect recovery. During the progress of these and various other symptoms consequent to wounds and injuries of the head, the skin, the tongue, the ear, the eye, the motions and sensations of the limbs, and the actions of the heart

itself, are variously and oppositely affected. In the eye, particularly, I have remarked the pupils contracted in some instances, and in others dilated, where the injury seemed to be nearly of a similar nature and degree; and I have seen one pupil dilated, and the other much contracted, in the same person.

Although we can with much probability say that paralysis or convulsion will take place on the side of the body opposite to the wound,* yet that occurrence (which is uncertain in its period of attack) will frequently take place either in the upper or the lower extremity, or in the entire of the opposite side, and be either partial or general, from causes which are altogether beyond our research. The opinion, that paralysis took place on one side, (that corresponding to the injury,) and convulsion on the opposite, I have never seen verified by experience. I have seen some cases of general nervous affection of both sides after violent injury, where one has been more affected than the other; and in those general affections, I have observed that convulsions have been a more frequent occurrence than paralysis, where the fore and side parts of the head have been wounded. Paralysis has occurred proportionally oftener in my practice, where the wound or injury approached nearer to the cerebellum. I have, however, seen paralysis on one side and convulsion of another, take place when the blow has been upon the forehead, and the same when it has been on the occiput. Before entirely dismissing this subject, I would offer one caution to the junior surgeons, suggested not by what *may* happen, but by what I have known *actually* to occur, viz., not to forget the effects of a blow on the head, and attribute the inability of motion in the limbs to other causes. I shall give the heads of an instructive case, which will be sufficient to illustrate this point.

CASE XLIV.

Paralysis mistaken for Dislocation.

A stout young fellow had the right parietal bone fractured by a fragment of shell, and the fractured part was much depressed.

* See an admirable paper on this subject in the Medico-Chirurgical Transactions, by Dr. Yelloly, vol. i. p. 183; and some valuable cases by Mr. Anderson, in the Transactions of the Royal Society of Edinburgh, vol. ii. p. 17. These cases are referred to by Dr. Bateman in the Ed'n. Med. Journal for April 1805. The conclusions drawn from them are,—1. One hemisphere of the brain being affected, morbid symptoms generally appear on the other side of the body. 2. When both are affected, the whole body suffers: 3. If only one is *violently* affected, the whole body suffers: 4. Though the cerebrum alone is hurt, it produces morbid symptoms in all the muscles of voluntary motion, from whatever point their nerves may arise: 5. In cases of external accident, the prognosis is most favourable where one side only is affected.

On recovery from the first stunning of the blow, he found he had lost to a certain degree the power of the opposite side; and the arm, particularly, was almost useless. By removing the depressed portion of bone, the paralytic affection was totally relieved in the other parts, and partially in the arm. This man passed through several hospitals, and was treated by different surgeons. He ultimately recovered the use of the arm also, but not without various, and, as it may well be supposed, ineffectual attempts at reducing a supposed dislocation of that limb.

On the last examination of out-pensioners in Edinburgh Castle, Assistant staff-surgeon Hill detected one case of paraplegia, and one of hemiplegia, of the left side, produced by a wound in the lower part of the occipital bone, and one case of paraplegia, and six of hemiplegia, from wounds affecting the parietal and other bones forming the sides of the head.

Much information may hereafter be derived as to the functions of particular parts of the brain, by a more minute examination than has hitherto been made into the effects of injuries.

Loss of the generative faculty, and atrophy of the organs connected with it, have been attributed to the blows on the back of the head. The fact is certain; but whether the antiphrodisiac effects proceed from injury to the organs of sexual love, or to a general loss of power, is a subject for future inquiry. M. Larrey gives a case, in which the blow of a sabre had cut off the external protuberances of the occipital bone, and divided the extensor muscles down to the sixth cervical vertebra, the spinous process of which was also cut off. This patient, after his cure, in answer to an inquiry on the subject, acknowledged that he had ever since been deprived of the generative faculty. He also gives another, where the testes wasted, and the "membri viril" became shrunk and inert. In the following case, the confession was not elicited by inquiry, but was the subject of spontaneous complaint to Staff-surgeon Hughes, in whose words I give it:

CASE XLV.

Affection of the Genital Organs from Wound of the Occiput.

"Gaetano, a soldier of the 9th Portuguese Caçadores, was struck by a piece of shell at Salamanca, in June 1813. It shattered the superior part of the occipital bone from within half an inch of the great knob on the left side, to the lambdoid suture.

An irregular angular portion of the left parietal bone, nearly an inch in length and about an inch in breadth, was also fractured and beaten inwards. He laboured under most alarming symptoms, total insensibility, involuntary discharge of feces, laborious breathing, inirritability of pupil, and weak low pulse, with occasional convulsive twitchings. The removal of the depressed portions of bone, and about an ounce of coagulum from the surface of the dura mater, on the second day after the wound, was attended with a diminution of most of the symptoms; and, with two copious bleedings, (which were employed to arrest approaching inflammation,) his recovery was perfected by the November following; except that even then, the catheter was occasionally necessary to draw off his urine, the bladder not having recovered from a paralysis, which, for the first three weeks, was so complete as to prevent any evacuation without the use of an instrument. Of this, however, he ultimately recovered. This man was subsequently attached to the mule with my medical stores, and repeatedly consulted me on the means of recovering his virility, which, he said, the shell had *completely carried away with it.*"

It becomes an object of inquiry, on which Mr. Hughes could not satisfy me, Did Gaetano lose any other function, the organ of which was injured? The organ of parental affection, according to the position assigned it by Gall and Spurzheim, must have been implicated. Was he as good a father as ever, or did he cease to love children when he lost the power of begetting them?

Priapism is occasionally observed to occur in wounds of the head. In a case which lately occurred in the cavalry hospital, near Edinburgh, this symptom was particularly remarked in an hussar, who had suffered severe injury by a fall from his horse. The penis was in a state of priapism during the greater part of the two first days after the accident, and towards the close of life he frequently rubbed the genitals violently with his hand. On dissection, the dura mater was found extensively separated all over the head. This separation included the "tentorium cerebelli," and beneath its edge about four drachms of coagulated blood were found, the principal part of which lay on the cerebellum.*

Some of the functions, particularly of the mind, are often severely and permanently affected, while others are not proportionally impaired, and the loss is but of temporary duration. The recollection of recent events is abolished in some cases, that of more distant occurrences is abolished in others, while in other instances the memory of certain classes of circumstances only,

* In dislocations of the lumbar vertebrae, the penis is generally erect. See Sir A. Cooper on Dislocations and Fractures, 4to. 3d edition, p. 484.

is impaired; thus, Baron Larrey states some instances where the patient could never recollect proper names, although on other points his memory was not defective. I know of an officer who retired from his corps in consequence of a gunshot wound, which injured a part of the frontal and left parietal bones, and produced loss of memory, confusion of ideas, and at length a general derangement of his mental faculties, with a paralytic affection of the right arm and leg. I had occasion to become acquainted with his situation in fourteen years after the receipt of his wound, when his state was as follows: There was a manifest depression in the site of the wound; debility of the whole body, with a sensation of cold even when the perspiration flowed copiously; involuntary bursts of laughter frequently came on; his memory was so defective that he was unable to recollect the name of his surgeon, or the day or month on which he last visited him. To these symptoms was added a constant giddiness of the head, so much increased at times that he fell senseless to the ground.

The powers of speech are often lost while those of memory remain, and the sight is impaired while the hearing is perfect, and *vice versa*. I have met numerous instances of this, and have had patients who told me that they could hear distinctly what I said, and distinguish my voice from that of others,—and have repeated my words as a proof both of this fact and of their retention of memory, while they could not distinguish my person or give utterance to their thoughts. The following case, in which I was deeply interested, illustrates this point:

CASE XLVI.

Severe Injury of the Head, with Loss of Speech, and other Nervous Affections.

Captain B——, a particular friend of mine, was wounded by a musket ball in the head at Waterloo, on the 18th of June, 1815. On the 19th, he was brought into the city of Brussels in charge of a medical officer, who gave me a most melancholy account of his case. On approaching the wagon in which he was conveyed, I was insensibly attracted to that part of it where he was stretched, by a low protracted moan, as of a person in extreme pain, but very weak. On calling him by name, he sat up, caught me by the hand, which he kissed most fervently, pointed to his head, and then to the site of a former wound which he had received at the storming of Badajoz, in 1812, from the effects of which I had the good fortune to relieve him. He then burst into tears, but without having the power of uttering a distinct word. His countenance was pale and ghastly, and his

mouth somewhat distorted; his eye languid, and suffused with blood; his skin dry, but cool; his pulse about 90, soft and compressible. As I found that he had been bled on the field, I contented myself with providing him a billet, and giving him in charge of his medical attendant, with directions to examine the wound most particularly; to enlarge it if fracture to any extent appeared; to administer a brisk purge, and to watch most carefully the approach of inflammation. The wounded being now pouring in by hundreds, I was unable to see him before the 21st; his case, however, was reported to me daily. Much coagulated blood, and some particles of sand on which he had fallen, together with a thin scale of lead, obviously a bit of a split musket ball, had been removed. His pulse had risen on the night of his arrival to about 100, hard and bounding, and he had been copiously bled in consequence. A cruciform enlargement of the wound had been made, which bled copiously, and gave a view of an extensive fracture of the left parietal bone. On my visit I found him nearly as follows:—Countenance pale, expressive of great pain, referrible more to mental than corporeal suffering; mouth still distorted; eye sunk, but its pupil dilatable; the power of articulating any distinct sound lost, but the desire obviously strong; pulse 80, soft: tongue clean, bowels open, (by saline purgatives;) urine copious, and with a rose-coloured sediment; skin moderately warm, and at the region of the liver bathed in sweat; the liver itself obviously projecting, and giving a painful sensation when pressed upon, evinced by his wincing from the touch.

On examining the wound of the head, I found an extensive radiated fracture, occupying almost the whole of the left parietal bone; at the centre there was a piece of bone, apparently the size of a musket ball, beat in through the membranes of the brain, and bedded in its substance, but considerably more toward the frontal region than the occipital. The unequal pressure I found to proceed from a musket ball which was wedged in between the displaced pieces of bone and the portion, which, though cracked, preserved its situation. The separated piece was obviously much more extensive on its internal face than externally, and could not possibly be extracted without the operation of trephining, to which I proceeded. The leaden wedge, and several loose splinters which jammed it in, were easily removed; and on making one perforation with a large sized trephine, I removed the depressed portion of bone, which was forced into the brain nearly an inch and a half from the surface of the scalp. It was of an irregularly oval shape, about one inch long by half an inch broad, and fractured in such a manner, that the internal table formed a much larger part of its circumference than the external.

No relief followed the operation; he passed an extremely restless night, and the pulse rose so rapidly and so high, that the abstraction of 16 ounces of blood became necessary. His breathing during this momentous night became, for the first time, permanently stertorous; and, when I saw him in the morning, his whole appearance indicated the most extreme danger. He lay *coiled up* in the bottom of his bed; the right arm stretched out, and occasionally convulsed; no exertion could get a sight of his eyes, or his tongue; the mouth was more distorted than usual; the skin was nearly as on the day of the operation, except that the partial sweating over the hepatic region was increased in profuseness, and he seemed to wince more on pressure at that part; indeed, all the sympathies seemed to be entirely merged in those connecting the brain and liver. The stomach participated remarkably little, for he had scarcely any vomiting. His pulse alone gave me some hopes; it was nearly natural. On addressing him, he made an effort to rouse himself, but almost immediately relapsed into his former state. I directed a strict watch to be kept over him; and as my duties called me again to that part of the city where he was lodged, I visited him about midnight, and found that a spontaneous bilious diarrhoea had come on, and that he was much more sensible. He made an attempt to articulate, and pronounced audibly the letter T once or twice. The next morning, being the 5th from the receipt of his wound, his general appearance was amazingly altered for the better; the diarrhoea still remained, and his efforts to speak were continual. On the sixth day he grasped my hand with great fervour, looked piteously in my face, and, to my inquiries as to his feelings, he uttered audibly, though with much labour, the monosyllable "THER," to which, in the course of the day, he added "O;" and for the three next days, whenever addressed, he slowly, distinctly, and in a most pathetic tone, repeated the words, "o; THER: o; THER:" as if to prove his powers of pronunciation. His general appearance, during all this time, amended considerably, and my hopes now began to revive. I therefore resolved to write to his family, and, before doing so, I printed in large characters, on a sheet of paper, the following words, "SHALL I WRITE TO YOUR MOTHER?" that being the wish which it appeared to me he so long and ardently had laboured to utter. It is impossible to describe the illumination of his countenance on reading these talismanic words; he grasped and pressed my hand with warmth, burst into tears, and gave every demonstration of having obtained the boon which he had endeavoured to solicit.

From this period his mental faculties gradually developed themselves; he regained a consciousness of the circumstances immediately preceding his wound, and, in succession, of those

of a more remote period. The power of speech was the last which he perfectly regained, and for which he usually substituted the communication of his thoughts and wishes in writing. Throughout the whole of his convalescent state, melancholy ideas constantly predominated, although, previous to the accident, he had been remarkable for his flow of spirits. He returned to England, nearly recovered, on the 29th of September, or 103d day from the wound.

I have omitted the minor details of surgical treatment after the operation, as they are not essentially connected with the point I wish to illustrate by the case; and, indeed, I have it not in my power to give them day by day, as, after he had made some progress towards recovery, I gave him over to another surgeon. I was assisted in the operation by Mr. Jeyes of the 15th hussars; my friend Mr. Lindsay, surgeon to the forces, was very constant in his assistance and advice; Professor Thomson often visited Captain B.; and Staff-surgeon Dakers was indefatigable in his after treatment.

This case may be advantageously compared with one given by M. Larrey,* in which a soldier, wounded in the head, formed a new language for himself. He expressed affirmation not by "Oui," but by the word "Baba." Negatives he gave by "Lala;" and his wants he made known by the terms "Dada" and "Tata." These sounds bore no analogy to the words properly expressive of his ideas. Captain B., on the contrary, strenuously laboured to combine all the simple sounds which composed the words that he wished to express.

In the foregoing case, the sympathy between the brain and liver was strongly marked, and took place at a very early period; but it is by no means such a universal occurrence as some practitioners imagine; nor does the affection of the liver, I suspect, *so very* often depend upon the direct injury of the head, as upon certain circumstances connected with it. A class of men more peculiarly liable to hepatic affections than others, are the most frequent subjects of fractured skulls. I mean quarrelsome and habitual drunkards, particularly those who indulge in ardent spirits; and we often find that the liver has been diseased long before the infliction of the injury of the head. It is scarcely necessary to say, that it will very often occur in men of the most temperate habits, and totally unconnected with the affections of the organ from habitual drinking, as was the case with Captain B——. I have known it take place within thirty-six hours from an accident, in a temperate female. It often happens, however, that neither the liver nor any other organ seems to sympathize with the injuries of the head, while,

* Memoires, vol. iii. p. 322.

in other cases, almost every viscus will appear to suffer more or less. These sympathetic affections vary in the organs which they attack, and in the degree of violence. In the thorax they appear from simple increased secretion from the lungs, to tubercles and extensive purulent formation in their substance.* Serum is also often found in the cavity, and very frequently in the pericardium; and even in the heart itself abscesses have been discovered. In the liver, morbid appearances are found throughout every shade of affection of its membranes or its secretion; either pain and tumefaction, with bilious diarrhoea, or the same with a perfect torpor of its functions; and inflammatory affections, from increased vascularity to the formation of extensive collections of matter. In the spleen, pain, tumefaction, hardness, and abscess, are occasionally observed. The stomach suffers more frequently than any other organ; but it appears to be more from general nervous sympathy than from any organic affection, which is seldom discoverable on dissection. Bertrandi, who, in the *Memoires of the French Academy*, vol. iii. p. 484 of the 4to. edition, has given a memoir upon the Abscesses of the Liver, which form after wounds of the head, asserts that they are most frequent when the patient vomits a green bile shortly after the receipt of the injury; when delirium and convulsions supervene; when blood flows from the mouth, nose, and ears; when the face tumefies, the vessels of the throat palpitate, and the hypochondria heave convulsively; and, as he says himself, "*pour ne pas puroître avoir rien passé sous silence*," when the patient lies comatose, stupid, and delirious, when the neck tumefies and grows livid, and the hypochondria are tense and painful. These abscesses, he asserts, are more frequent on the convex than the concave side of the liver, and more generally deep-seated than superficial. My experience does not confirm any of the observations of the academician. His theory is, that in concussion a greater quantity of blood being sent to the head, a greater quantity is of course brought to the right auricle, presses on the inferior cava, and gives rise to accumulation in the liver. Pouteau thought, that, instead of a greater determination to the head, there was an obstruction there, and a congestion in the liver. Desault attributes it entirely to sympathy. Richerand accounts for it mechanically, and adduces proofs drawn from the effects of precipitating dead bodies into a deep pit meant for their reception at the hospital of St. Louis, in which the liver has been torn to a considerable extent; but I conceive that the circumstance of

* See Morgagni, Epistle 51, Articles 17, 18, 19, 20, from Valsalva; and Article 21, from Nicolaus Massa and Marchetti, a case with abscess in the heart and water in the pericardium.

the liver being affected by a blow on the head, where the patient has not fallen, militates much against this explanation, and that we are still at a loss to trace the cause. The connexion, we know, exists, but we are ignorant of the extent. It exists, though not uniformly, both in slight injuries of the scalp and severe fractures, and shows itself from the bilious erysipelatous tinge produced by a scratch on the teguments, to a deep-seated abscess. Of this, however, we are assured, that it is in the primæ viæ alone we can encounter those symptoms in their various shapes and degrees.*

Protrusions of the brain, in many instances which I have seen succeeding to gunshot and sabre injuries, have not appeared to me to proceed solely and exclusively from any one cause, but to depend on several, sometimes acting singly, and often in combination. The first and most simple cause has proceeded from actual violence, which has partially separated a portion of the cerebral mass, and has been obvious at the first dressing of the wound. The second has succeeded the removal of the support of the bony case, or the membranes, either by the original wound, by operation, or by subsequent inflammation and sloughing. The third class has been the effect of contusion, producing a morbid alteration of the brain itself,† which either comes forth unaltered in appearance, or shoots out a bloody coagulum, arising from a ruptured vessel, or else pushes forth a new product, easy and safely separable by the knife, and quickly renewed, like fungus growth, in other parts: or, lastly, it proceeds from a gradual but often extensive breaking down of the brain into a bloody pulpy mass, which appears to issue forth by its own fluidity, unconnected with any propelling action of the blood vessels.

Examinations after death (which is the general result of these cases) give ample proofs of the existence of protrusions from coagulated blood; and that proceeding from the substance of the brain itself is obvious, both during life, from the appearance of the substance protruded, and from the examinations *post mortem*, when the loss can be detected in the cerebral mass within the skull, and the protruding parts are observed to correspond with the deficiency in quantity and consistence.

* Klein, a German surgeon, asserts, that the liver sympathizes much oftener with wounds of the shoulder-joint and thorax than with those of the head.—“Chirurgische Bemerkungen.” A paper of much interest on this subject will be found in the 1st volume of the “Actes de la Société de Médecine” of Brussels, by M. Curtot.

† The disposition may exist without a fracture, as has been observed by Dr. Thomson. See his Report, p. 57. Schmucker also notices this alteration of the brain; and it is not unfrequently met with after death in cases of gunshot injuries.

That a true and rapidly increasing fungus product is thrown out, is also evident by external inspection, and by observation on the dead subject, where the cerebral mass is found undiminished in size, notwithstanding the great quantities of fungus that have been cut off, torn away by the patient in fits of delirium, or spontaneously removed with dressings.

The following is a curious and instructive case, in as much as it shows a combination of the different causes; it illustrates the violent injury which the part is capable of suffering from the accident, and from the escharotics and the knife of the surgeon; and it exhibits a depressed state of the circulation, which I have not had an opportunity of witnessing in any other instance.

CASE XLVII.

Severe Injury of the Brain, with Fungus.

Francis Wilde, 1st battalion 95th regiment, aged 28, was wounded by a musket ball in the action of the 16th of June 1815, at Quatre Bras. The ball struck the frontal bone, about an inch above the right eyebrow, and passed in a direction towards the squamose suture of the temporal bone. He walked from the field of battle to Brussels by the help of two of his comrades. He was first seen by a native surgeon, who cleaned and dilated the wound, and then sent him to the Jesuits' Hospital, where a longitudinal fracture was discovered, of an inch and a half long, and one broad, but no depression. The fractured bone was divided into four small pieces which were easily picked away, leaving the surface of the dura mater uncovered. In dressing him on the third day, fully a dessert spoonful of the brain, and some loose splinters, were discharged, but he did not appear to suffer the slightest inconvenience. Indeed, after the most minute inquiries, both by Staff-surgeon Boggie and myself, we could detect no morbid symptoms, nor the smallest difference in his system from that of a man in perfect health, except that his pulse was reduced to the very extraordinary lowness of *thirty-six beats in a minute, and had been by report, so low as thirty.* This exemption from existing disease did not lull us into security as to its eventual occurrence; and a most rigid abstinence was enjoined, with occasional purgings, and a direction that bleeding should be had again recourse to (he had been bled three times before I saw him) on the appearance of any threatening symptoms. On the 10th day, I found Wilde in his general health and appearance the same as before, with the exception of his pulse, which had risen to 46 beats. At this rate it continued for several days; and, on the 28th day, it had got up, by a very

gradual and progressive range, to 72.* From this period he was observed to sleep a great deal, and he became very uneasy on being moved. No particular change occurred until the 38th day, when a grayish-coloured spongy fungus, containing much coagulated blood, was observed, to protrude from the wound, strangulated, as I may say, by the edges of the fracture, which had fairly formed a groove in it. He now complained of severe pains darting from ear to ear; both the pupils were dilated with a slight degree of strabismus in each eye; skin natural; tongue whitish; thirst urgent; appetite impaired; and there was occasional nausea and vomiting on taking his saline purgative draught, which he frequently used, to keep his bowels regular. The fungus, on the 40th day, notwithstanding the use of the red oxide of mercury, which had been employed to destroy it, had increased; the edges of the wound got puffy; he lay nearly comatose, the strabismus was greater than before; the left angle of the mouth was drawn upwards; the bowels were constipated, and the tongue was covered with a dry black crust; pulse 76, and soft. Some spicula of bone came away with the dressing, and the fungus poured out a quantity of blood. Towards the evening, the symptoms became aggravated; he moaned incessantly; and on the dressing of the next day the protrusion was found to be to a very large size, nearly that of an egg. It pulsated very strongly. It was now determined to remove it by a stroke of the scalpel; this was done, both on that day and the next, with very little consequent hemorrhage, and the part was afterwards dressed with dry lint, and a small pasteboard compress. On examining the fungus, it was not as expected, and as it originally appeared to be, chiefly coagulum, but from the feel and appearance, obviously brain itself. On the evening visit it was found necessary to tie his hands, to prevent him from tearing off the dressings, which he had done in the intervals of the visits, and had dragged away with them a large piece of fungus which had rapidly protruded, although its removal by the knife was again tried. His general appearance, however, was better; he was sensible to external impressions, and answered questions rationally, but complained of great pain on touching the wound. On the 42d day, although he tore off more of the fungus, he complained less of pain, and was quite sensible, knowing and conversing with the bystanders; he had not that great appearance of anxiety as before. From this to the 45th day he got progressively worse; the cerebral mass continued to flow out at each

* The erect, or horizontal position, had no effect in altering the rate and number of the beats, which were always ascertained by two persons, one with a stop-watch, the other with a minute-glass. Mr. Burn states a case where the pulse sunk to *eleven* beats, and even to *ten*, but it was a case of organic disease of the heart. See his "Observations on Diseases of the Heart," pp. 42—46.

dressing, more fluid and bloody in appearance than before, and with obvious masses of coagulum; and at four o'clock, P. M. he expired in the greatest apparent agony. I was naturally anxious to inspect the body, but a very few hours after death it became highly offensive; and the young gentlemen were so much afraid that it would spoil altogether before my avocations permitted me to examine it, that they removed the head with the intention of throwing in an injection to trace the state of the vessels, and discover, if possible, the ruptured one, which we all along suspected. But before the necessary apparatus could be got, putrefaction advanced so rapidly, that it was determined to saw off the skull-cap, and place the brain in a basin of water for inspection. Professor Thomson and Dr. Somerville assisted us. We found that the right hemisphere of the cerebral mass was reduced to a sort of bloody pulp, still retaining some shape of what it had been, but much diminished in size, and rendering it absolutely impossible to trace its organization. The left hemisphere, although obviously suffering from disease, was not so much affected, but was covered with a net work of turgid vessels.*

The mildest dressings, the cautious employment of pressure, supporting the parts as much as possible by the approximation of the edges of the scalp, and avoiding every species of stimulus, are the means that I would recommend in these cases, in which, independent of the protrusion, there is often a serious injury of the entire mass of the cerebrum. Some surgeons have ventured on the use of escharotics; but I have generally seen their employment succeeded by a great aggravation of the symptoms. They have been employed to a greater extent by the late Mr. Hill of Dumfries, than perhaps by any other British surgeon; his experience on this subject will be found well worth consulting, and is to be met with in his "Cases in Surgery."

Mr. Abernethy has thrown a brilliant and steady light upon this, as he has done upon every subject which he has enlarged on. An interesting paper by Crell, and another by Sand, "De Fungo Cerebri," is to be met with in the 1st vol. of the "Disputationes Chirurgicæ of Haller," and an inaugural dissertation of great merit has recently been published by Dr. Abraham Solomons, "De Cerebri Tumoribus," Edinburgh, 1810. But perhaps the greatest mass of information that has ever been collected upon the point is to be found in the admirable memoir of M. Louis, "Sur les Tumeurs fongueuses de la Dure Mere," in the 5th vol. of the Memoirs of the Royal Academy of Surgery.

* The remarkably rapid putrefaction of dead bodies after injuries of the head has been long since observed, particularly by Hildanus, Cent. II. Obs. 25, 26, and by Morgagni, Epist. 51, Art. 57, and Epist. 52, Art. 15. I have had repeated opportunities of witnessing it. The same rapid putrefaction takes place in animals killed by lightning and in electrical experiments.

Concussion, as well as compression, is a very frequent effect of fracture from shot or sabre wounds, and also from grazing round shot, and fragments of shell, earth, or stones. The diseases are frequently coexistent, and so often run into each other, or differ merely in degree, as to render it impossible in every case to lay down accurate distinctive marks between them. Neither the state of the pulse, the eye, the breathing, nor the skin, are infallible guides; we have an unerring one, however, in our most powerful remedy, if not to the precise nature of the case, at least to its most proper treatment,—I mean venesection; and the younger surgeon who allows himself to be seduced by representations, of the impropriety of copious bleeding in soldiers, will deprive himself of a most important and useful auxiliary when judiciously employed. No well informed man now-a-days, it is true, flies to the lancet the moment he hears of a wound of the head. He examines the case, and, from appearances, decides on the *immediate* necessity of abstracting that blood which he well knows he must *ultimately* have recourse to when reaction takes place. If the concussion is so violent that the powers of life are absolutely sinking, to bleed instantly would be to destroy the patient. A glass of wine or of spirits poured down his throat will be the proper remedy. If the wound is not attended with great sinking, which is often fatal, then indeed the lancet and a brisk purgative are the appropriate remedies, whether we call the affection concussion or not.

In the field, and throughout the whole practice of military surgery, venesection becomes, if possible, more necessary, because all the operations which may be ultimately called for, cannot, under the urgency and confusion of existing circumstances, be immediately performed; and the judicious use of blood-letting renders the deferring them less dangerous, and may even supersede the necessity of operation at all; an object the value of which those will best appreciate, who know the frequent results of surgical operations in crowded hospitals.

The cordial and the depleting plans have each had their advocates, and some of our most able surgeons have been divided in their opinions. It has fallen to my lot, on several occasions, to see the plans contrasted on a large scale, where foreign and British surgeons have practised under the same roof; and the balance of success was so very decidedly in favour of the latter, as to confirm me in the propriety of abstaining from internal stimulants. But if the depressed state of the system, which immediately succeeds violent concussion, continues beyond its usual period, or is great in degree, and particularly if the pulse sinks on a cautious trial of the lancet, I have derived great benefit from applying a blister, using the warm bath, and administering guarded doses of pulv. ipec. compositus. If leeches can

be procured, local bleeding on or near the site of the wound should never be omitted. In some cases of concussion general bleeding may be combined with the use of antispasmodics; and there is a recent case where the use of an enema (which, from my own experience, I can recommend as powerful) of asafoetida, dissolved in water, had a most remarkable and instantaneous effect, preceded and accompanied by bleeding from the arm and temporal artery.* But in no case should we lose sight of the necessity of guarding against inflammation, and watching its insidious approach with the most jealous caution.

A very curious example of pure concussion is given us by Schmucker,† in which a canon ball took away the queue from the nape of a soldier's neck without injuring the integuments in any sensible degree. He continued in a complete state of stupor for many days, during which he was bled at least twenty times. Twenty-four grains of emetic tartar, given at short intervals, produced some stools, but no apparent inclination to vomit, after having suffered a relapse from having been moved prematurely on a march with the army. In the case of my friend Colonel T., although the neck of his hussar jacket was cut by a round shot at Waterloo, the shirt torn, and the skin of the nape of the neck grazed, no one unfavourable symptom appeared, and he complained only of very acute pain and stiffness of the parts.

Wounds of the head, which are not productive of the dreadful symptoms of concussion or compression, often lay the foundation of very troublesome spongy sores and indolent exfoliations, attended with extreme headachs, and sometimes amounting to inflammation of the brain or its meninges, and even to the formation of matter on or between these parts. The general principles applicable to inflamed parts, and to exfoliating bones, are applicable here, but requiring a promptness proportioned to the importance of the organ concerned. Exfoliation is more rapid, and a granulating surface of new growth succeeds more frequently upon the bones of the skull after an injury, than on other bones; but if the symptoms do not soon yield, it would be manifestly improper to wait for exfoliation, when, by the simple application of the crown of the trephine, we can at once remove the source of irritation. On this point, as well as on the entire class of injuries, I cannot too often refer to the excellent Pott.

The tendency to relapse, left after injuries of the head have been got safely over, is very great, and demands for its preven-

* See a case by Dr. Thomson of Halifax, in Edinburgh Medical and Surgical Journal, vol. x. p. 12.

† In his Chirurgische Wahrnehmungen, Berlin, 1759, case 3d, p. 393.

tion a rigorous system of abstinence of all kinds, little palatable to military patients. Slow as the brain is, in some instances, to take on a diseased action, it is amazingly irritable in others. Among a great variety of accidents of this kind, I was most particularly struck by the following case, of which, by the kindness of Staff-surgeon Dease, I acquired the history. Although by no means unusual, it is valuable, in as much as it shows the dangers of excess in the patient, and the great probability of relief from puncturing, not the investing membranes of the brain only, but even the brain itself.

CASE XLVIII.

Fatal Relapse, with Abscess in the Brain.

A young officer of the —— regiment had his os frontis fractured, and a part of it removed at one of the decisive battles in the neighbourhood of the Pyrenees. The skill of his medical attendants carried him through the immediate effects of the injury, but his own social disposition led him, with the wound still open, to the society which frequented the coffee rooms and the brothels of the city where our general hospital was at that time established. A return of all his symptoms, in a most aggravated form, was the speedy consequence, and death very shortly ensued. From the antecedent symptoms, the formation of an abscess in the brain was confidently predicted by Mr. Dease, and the spot where it would most probably point was even indicated by the appearance of the wound. A difference of opinion, springing no doubt from most laudable anxiety for the patient's welfare, prevented the performance of any operation; although all acknowledged the safety of the measure on some occasions; and it was only after examination of the body, at which I was present, and the detection of a large abscess filled with purulent matter, mixed with some clots of blood, to the amount of four ounces, and within one tenth of an inch of the surface of the brain, that the probable good effect of puncturing was demonstrated.

Schmucker gives a most interesting case, his 29th, p. 297, illustrative of this point, where a ball stuck in the os frontis of a soldier; the inner table was forced in on the dura mater; it was removed by the trepan, and some coagulated blood brought away; he did well until the nineteenth day, when the pulse began to intermit, the dura mater became raised, and seemed to have a fluid under it. He made a small puncture, and two ounces of a whitish lymph were immediately discharged by the opening. The puncture closed, and three days after, the mem-

brane being again raised, he made a crucial incision, through which an ounce of whitish fluid was evacuated. He kept this open with sindons dipt in a stimulating balsam, and the patient recovered speedily.

It is not the casual escape of a few that should betray us into the most remote encouragement of a deviation from rigid regimen in our patients. Hundreds of soldiers have lost their lives by a childish facility of the younger surgeons in allowing them extras, (as they are technically called,) that bane of health, and source of endless abuses in hospitals. I doubt much whether, upon the whole, the service would not be benefited by striking them off from the diet rolls altogether, and issuing them as medicines. But independent of the abuse of food, daily experience shows, that even its moderate use may prove highly injurious in injuries of the head; and it is not an unfrequent occurrence that men who have suffered long privations in that respect, combined with exposure to cold, have manifested no dangerous symptoms, until taken into hospitals where their wants have been supplied. The employment also of female servants is a measure, the utility of which is very questionable, particularly of that class that usually follow camps and hospitals. These persons are not only far less efficient than men, and less amenable to the rules of police, but sexually they are often extremely hurtful.*

Whenever the symptoms of formation of matter, or effusion of blood, and consequent compression of the brain occur, if we hesitate as to the application of the trephine, we deprive ourselves of our only resource. That it has been often unnecessarily employed, is very obvious; the numerous instances of escape, however, show clearly, that uncovering the brain is not so very dangerous as has been argued by some, especially at the part where an injury has been inflicted, and where there is a probable separation of the dura mater. But if due attention is paid in the first stages (which it has been my object principally to enlarge on,) the number of these secondary, and but too often fatal cases, will be most materially diminished. Directions, as the eminent Pott observes, "to be given on these subjects can be only and truly general; all the rest must be left to the judgment of the surgeon, which judgment must be formed from the peculiar nature of each individual case."

The cases which absolutely require the trephine may be reduced to the two following: *First*, where a fracture exists, and a depressed or diseased portion of bone, a ball, or other extraneous matter cannot be otherwise removed. *Secondly*, where no

* For a very remarkable case illustrative of this, see Hildanus, Cent. 1. Obs. 19.

fracture exists, but urgent symptoms of compression occur. In the first case, which is by far the most common in military surgery, there can be no hesitation as to the spot to which the instrument is to be applied. In the second case, if there is a wound in the integuments, and if it loses its healthy appearance, and a separation of the periosteum takes place, all surgeons are agreed upon the propriety of applying the trepan at that point. But, where there is no wound, the case becomes much more dubious, and we are reduced to act upon probability, founded upon accompanying circumstances,—as the gestures of the patient, or his sensibility to pain on pressing a particular spot, or we may be guided by what the French surgeons place much dependence on, *viz.*, the existence of a paralysis, which is most commonly on the side of the body opposite to the compressed portion of brain. This last, however, is the most doubtful of all our guides, for although the pressure may exist on the side indicated, it may be situated beyond the reach of an operation. Upon the whole, we may say with the eminent surgeon above quoted, “No man, who is at all acquainted with this subject, will ever venture to pronounce or promise success from the use of the trephine, even in the most apparently slight cases; he knows that honestly he cannot; it is enough that it has often been successful where and when every other means have failed.” With regard to the precise spot on which the instrument is to be applied, I believe, that, in steady and judicious hands, it may be used on almost any accessible point of the skull, but if we have to choose, the least dangerous spots will be found above a horizontal line drawn at an equal distance from the sagittal suture and the root of the mastoid process.

I have already given a case (Case XLVI.) where the trephine was successfully applied to the fractured parts for the removal of depressed bone, and a musket ball. A case occurred in the practice of Staff-surgeon Cooper at Waterloo, where there was no fracture, but where the success was very remarkable. The patient had been struck, as stated by Mr. C., with a musket ball on the right parietal bone, which was exposed, and had no appearance of being fractured; as, however, the symptoms of compression were urgent, and the patient was in nearly a lifeless state, he conceived it right to apply the trephine to the part on which the violence had acted. He had not sown long before the external table came away in the hollow of the trephine, leaving the inner table behind, which was not only splintered, but driven at one point more than half an inch into the membranes, and substance of the brain. No sooner were the fragments taken out with a pair of forceps, than the man instantly sat up in his bed, looked around, and began to speak with the utmost rationality. It is a most extraordinary fact, that this pa-

tient got up and dressed himself the same day, without leave from the medical officers, and never had a bad symptom afterwards.

I have been favoured by my friend Dr. Stewart, surgeon of the 71st regiment, with a case which appears to me extremely valuable to military surgeons, and which illustrates the application of the trephine under circumstances of a still more ambiguous nature, where scarcely any clue to the existence of the mischief existed.

CASE XLIX.

Successful application of the Trephine for the removal of Coagulated Blood.

“ Michael Cavenagh, about 36 years of age, of rather a robust habit, and sanguine temperament, and much addicted to drinking, was brought from the guard room of a neighbouring village, where he had been lying for 24 hours, under the supposition that he was in a state of intoxication, on the evening of the 31st of December, 1815. His eyes appeared blackened all around, and there was some degree of stupor, which was treated as the effect of debauchery. He was ordered a strong cathartic, and I expected to turn him out of the hospital on the following morning.

“ On the 1st of January, 1816, he appeared in a state of extreme torpor, with partial abolition of the senses; the weather was extremely cold, he lay with his feet exposed and uncovered; he felt quite cold, and had a livid appearance; pulse about 65, and regular; countenance pale. On examining the head, the whole scalp appeared puffy, and oedematous, but no mark of particular injury; the cathartic ordered on the preceding evening had produced one dark and fetid stool. Warmth was directed to be applied to the feet, and the cathartic was ordered to be repeated.

“ In the evening the natural heat had returned in the extremities, but he continued in a comatose state, answered questions incoherently, and only when roused; he expressed a degree of sensibility on pressing on any part of the scalp, which was generally much thickened, and pitted on pressure; this diseased state of the scalp was most prominent on the right side, and there was somewhat more of ecchymosis about the right eye than on the left, but no particular point to mark the existence of injury underneath; pulse still slower than natural, but more full than in the morning; one free stool from the cathartic. Thirty ounces of blood were drawn from his arm; cold lotions were applied to his head, and the cathartic pills were repeated.

“ *January 2d.*—Appeared more collected, and less comatose; state of the scalp much the same; pulse about 84, and by no means strong or full; no effect from the cathartic pills; they were repeated, and the lotion was continued. In the evening the intellectual faculties continued much the same; the pulse was increased in frequency, and there was more heat of skin; no evacuation from the bowels. The blood-letting was repeated, and the cathartic pills were continued every two hours, aided by a stimulating injection, until the bowels were freely open; the cold applications were also continued.

“ *3d.*—Very copious evacuations from the bowels in the course of the night, of a dark colour, and highly fetid; frequent horripilation in the morning; countenance pale and sallow; oedema of the scalp diminished, and there appeared something like irregularity on the surface of the right parietal bone, towards its anterior and upper part; the pupils were much dilated, and insensible to the stimulus of light which had not previously been the case; pulse 116, and small. The cranium was examined at the most suspicious point; no fissure or fracture could be detected, the trephine, however, was applied on the part, and thick coagula of blood appeared upon the surface of the dura mater. Six applications of the trephine were necessary in order to make such an opening as was considered sufficiently large effectually to relieve the patient;* the effusion was of great extent, and the coagulated mass of incredible thickness and density; as much as possible was scooped from under the bones all around, and the distance to which the dura mater was removed from the cranium admitted of this being done with much freedom. The parts were dressed with simple ointment, and the cold applications were continued.

“ *4th.*—The patient appeared relieved in so far that he was more collected, with diminution of the frequency of the pulse, and less dilatation of the pupils; free discharge of greenish-coloured matter by stool in the course of the night; heat of skin rather below the standard of health; during the operation on the preceding day, there was a free discharge of blood from branches of the temporal artery. Cold applications were still continued to the head, and cold drink was freely allowed him.

“ *5th.*—Disposition to fever; face flushed; no horripilation: state of intellect much the same; pulse about 100, and sharp in the stroke; no stool for 24 hours. A cathartic was adminis-

* It is not to be supposed that a perfect circle of bone was removed by each succeeding application, (although more than half a circle became necessary,) the object being to make the opening as large as required, at the same time avoiding as far as possible the formation of angles.

tered; venesection was repeated to deliquium, and the cold applications were still continued.

“ 6th.—Thirty ounces of blood were taken away on the preceding, and sixteen on the morning of this day, to check the inflammatory symptoms which threatened; after the last bleeding he continued very low for some time; bowels opened in the course of the night; considerable thirst; no discharge from the wound, except serous matter, mixed with coagulated blood; pulse about 10; he appeared altogether more collected.

“ 7th.—Passed a very uneasy and restless night, with much fever. On examining the head, the scalp was found to be detached from the cranium on both sides, in the line of the coronal suture, with an evident fluctuation underneath. By an incision in the line of the suture, vent was given to a considerable quantity of ill-conditioned matter, which flowed from under the pericranium in the direction of the suture, and also through the exposed part of the suture, which was quite open:—the parts being in a sensible and irritable state, an emollient poultice was applied over them.

“ 8th.—There was a free discharge from the head, and the patient was much easier. Pulse 86, regular, and moderate in strength; more collected and rational than before, but the extent to which the cranium was separated from its covering, as well external as internal, rendered the issue more than doubtful. Up to this date has taken nothing in the way of nourishment except rice water and tea. Bowels not perfectly free; in consequence of which, he was ordered a solution of Epsom salts.

“ 12th.—From the date of last report, a free discharge continued from the head, coming from under the scalp, and also from within the cranium; the latter mixed with the remains of the coagulated blood originally effused, and the former with portions of slough. The divided edges of the scalp appeared pretty healthy, although the nature of the discharge was still indifferent. He now gave perfectly rational answers to all questions, though he was somewhat volatile when allowed to indulge in conversation. Had a violent desire for tobacco, which he was in the habit of using freely when in health. Bowels regular; very weak, and much reduced in strength. Pulse from 90 to 100 in the morning, and from 100 to 110 in the evening. Allowed weak broth, bread, and a few potatoes at his earnest desire.

“ From the date of last report until the 22d January, the state of the patient continued to improve, in so far that the discharge diminished in quantity and became better conditioned, and granulations began to shoot on the bone that had been deprived of its covering. For some time the discharge of matter from within the cranium was very copious; it appeared to come principally

from the direction of the longitudinal sinus and left side of the head. In consequence of the discharge which was kept up from under the scalp on the left side of the head, it became necessary to make a counter-opening over the suture on that side, to give direct issue to the matter. The man's senses appeared almost perfectly restored; his appetite greater than could be prudently indulged. Pulse very quick and small; strength reduced much, but improving; in which state, on account of the march of the regiment, it became necessary to send him to the general hospital at St. Denis, near Paris.

"From all that I could learn concerning this man, it appeared that he must have received the injury on the night between the 27th and 28th of December, as on the morning of the 28th he was picked up in the market place at Versailles, as was supposed, in a state of intoxication, as the troops were marching off, and was placed on the baggage-wagon of another regiment, which, coming in contact with the baggage of the regiment to which he belonged, on the following day's march, he was transferred to it, and arrived in the village in which his company was quartered that night, when, being supposed still to labour under the effects of drink, he was confined, as he was a notorious subject for irregularities of the kind. Not recovering, as men usually do, he was conveyed to the hospital at head quarters, in the state that has been already noticed. On admission, from the account which was then given, and the habits of the patient, he appeared to labour more under the effects of long exposure to cold after a debauch, than of particular injury of the head, and it was not till nearly twenty-four hours after his admission that I was fully convinced of the existence of some serious effusion on the brain; when this was presumptively settled, it remained still uncertain at what point an attempt was to be made to relieve the symptoms. The urgency of the case soon demanded a trial, and it so far succeeded. Here was no external wound,—no puffy tumour,—no evident depression,—no fissure or fracture on cutting down upon the bone. The patient appeared so low, and his feet so livid and cold on the morning after he was received into hospital, that I even ordered him some spirits and water, until, after a little reflection and re-examination, I began to suspect the true nature of the case, and counter-ordered it. The quantity of blood effused was great; the solidity of the coagulum unusual; the extent to which it spread such that it was considered that no effectual relief was likely to follow from a small opening. Even after the instrument was applied, as has been mentioned, and the coagulated blood scooped out all around with much diligence, yet a great deal remained.

"The appearance of the puffy swelling over the suture, on

the second day after the operation, made me suspect that I might have overlooked the real seat of the injury: on making an incision to discharge the matter, nothing was found underneath but an open suture.

“By subsequent inquiry, I was kindly informed by my friend Staff-surgeon Murray, that the man recovered without any exfoliation, or the occurrence of any remarkable circumstance during the rest of the cure. Some months afterwards I signed his discharge from the regiment as unfit for service.

“While he was under my care, the discharge of matter from within the cranium was such, that, for some time, at each dressing, I cautiously pressed the dura mater inwards, changing the position of the head, and it flowed freely over my fingers. The separation of the soft parts from the bones externally, I conceive, indicated a corresponding separation of the dura mater within, yet no exfoliation followed.”

I have twice seen the trephine applied in private practice, where there was no other indication for the point of its application than the existence of paralysis on the opposite side of the body; the symptoms of compression certainly justified the attempt, but they were both unsuccessful; neither blood, nor matter, nor counter-fracture were found on the side trepanned; no dissections were made to elucidate the real point of injury.

Counter-fractures are not by any means so frequent from gunshot or sabre wounds, as in the accidents of civil life occasioned by falls from heights, &c so common among workmen; they are sometimes met with, however, and are among the most dangerous and unmanageable of the class. The two following cases exhibit the effects of very extensive injury from falls. In the first there was a counter-fracture diametrically opposite to the point where the injury was inflicted, and it affords one of the most complete specimens I ever met of fracture of the base of the cranium. In the second case, the combined effects of concussion, compression, and fracture, to a very great extent, are exhibited. Both the cases and dissection reports are drawn up by Mr. Johnston, surgeon of the 88th regiment, to whose zeal and accuracy I have been indebted on numerous occasions.

CASE L.

Of Counter-fracture at the Base of the Cranium.

“December 6th, 1818.—Last night, G. R. being very much intoxicated, fell from the top of the stair leading to his barrack room, consisting of seventeen stone steps. He is in a state of

complete coma, from which he cannot be roused by any means that are used. The breathing is rather quicker than natural, and in some degree stertorous; it is performed, as is frequently done in sleep, through the nose, but with the mouth open; the passage from the glottis through the cavity of the mouth being shut by the retraction of the tongue, and the root of that organ being pressed against the velum and palate. The pulse is slow, (65,) full, and strong, but very irregular. He moans frequently, and is restless, often lifting his hands to his head, as if to remove something inconvenient or painful. He evinces sensibility to pain, by groaning and by writhing his limbs when his head is pressed on to discover the seat of the injury. The eyelids are shut, but when lifted up the eyes appear natural, with this exception, that he does not seem capable of directing them to any object: nor do they afford any expression of consciousness of the impression of objects that are presented to them. The pupils are of their natural size, and the irides appear to possess their natural susceptibility of the stimulus of light. There is a small lacerated wound in the integuments covering the superior and posterior portion of the right parietal bone, but without any tumefaction to prevent the most accurate examination of the subjacent bone. Neither at this point nor any other can any fracture or depression be discovered in the bone. There is some bleeding from the nose, and also a little from the right ear, but there is no appearance of any cerebral substance with it.

“1, P. M.—Thirty ounces of blood were taken from the arm, in the morning. He has had no alvine evacuation since he came in. General symptoms as last described. He was now ordered a large dose of calomel, and a purgative injection was administered.

“4, P. M.—The pulse is still full and strong. There is more restlessness and jactitation. The other symptoms remain as before. The bleeding was repeated.

“12, P. M.—About 20 ounces of blood were taken at 4 o'clock, when the pulse became smaller, and rather more frequent. At present he seems to be in articulo mortis. The breathing is feeble and difficult, several efforts being made to inspire before an expiration is performed. The pulse is small, indistinct and tremulous. The pupils of both eyes dilated to their utmost extent, and totally immovable on the approach of a strong light.

“7th.—Died shortly after the visit last night.

“*Appearances on Dissection.*—As mentioned in the history of the case, the only mark of violence which appeared externally was a small lacerated wound of the integuments over the posterior and superior portion of the right parietal bone, with some bleeding from the nose and right ear.

“ On removing the soft parts covering the cranium, the right temporal muscle was observed to be much bruised; and underneath it, the temporal and parietal bones were found to be fractured in various directions, the fissures diverging somewhat in a radiated form from a point a little above the meatus auditorius. At this point a portion of bone was insulated by the fracture, and loose, but no part of the bone was in any degree depressed. The most extensive fissure ran in a direction backwards and upwards, to near the middle of the occiput. There was no fracture in the immediate neighbourhood of the wound in the integuments.

“ The upper part of the cranium being removed in the usual manner, discovered that portion of the dura mater lining the left half of the frontal bone, and which was *diametrically opposite* to that in which the wound in the external integuments was situated, tensely distended, and of a deep purple colour, from the blood effused underneath it. The upper portion of the dura mater being removed by a circular section corresponding with that of the bone, a very considerable quantity of coagulated blood was found upon this part of the surface of the brain, and part of the cerebral substance itself appeared disorganized, and blended with this grumous mass.

“ Having removed the cerebrum and cerebellum from the cranium, that portion of the dura mater which lined the right temporal bone, but more particularly the part of it at which the various fissures converged, was separated from the bone by a considerable quantity of blood effused between their surfaces. That part of the petrous portion of the temporal bone which forms the roof of the tympanum was fractured in an irregular manner,* and from thence a fissure proceeded along the basis of the cranium obliquely, inwards and forwards, crossing the ala of the sphenoid bone, and terminating in the cribriform plate of the ethmoid bone. No tumour or derangement of parts was to be discovered in the internal structure of the cerebrum or cerebellum.”

CASE LI.

Of Severe Concussion, Compression, and Fracture.

“ Nov. 11th.—W. C. aged 30, having fallen over the rock, endeavouring to escape from the garrison of Edinburgh Castle, in a state of intoxication, was brought into hospital (11 P. M.) in a state of perfect coma, the breathing irregular, sometimes

* A small portion seemed depressed, the fracture running round it, so as completely to insulate it.

carried on with apparent ease, and then, without any obvious cause, suddenly becoming laborious and stertorous; the circulation irregular, both in point of frequency and strength. He has a wound in the integuments of the head, covering the upper and posterior part of the right parietal bone. On examining the bone, however, after dilating the wound sufficiently for that purpose, it was found not to be injured. There is a contusion of the superciliary arch of the right eye, by which the eyelids of that side are livid, swelled, and closed. No injury appears to be done to the ball of the eye. No fracture nor depression of the bone can be discovered at this or any other part of the cranium, on the most careful examination. A feeling of crepitation can be indistinctly felt in the neck in the situation of the fourth and fifth cervical vertebrae. No important injury appears to have been sustained by the trunk or extremities.

“The pupil is capable of dilatation and contraction on exposure to different shades of light, but its relations to that stimulus seem to differ essentially from those of the healthy state. Its contraction is not uniformly the consequence of an increased intensity of light, but frequently dilatation occurs, when we would expect its contraction, and vice versa. Nor is this inverted order of things uniform in its occurrence, but sometimes the one effect and sometimes the other, is produced by the approach of a candle to the eye. He has every five minutes a slight spasmotic affection of the arms and hands, extending them with a moderate degree of rigidity, and bringing them obliquely over the sides and abdomen; this terminates in a few seconds, and the muscles become relaxed and motionless, till a similar spasm recurs. He seems very sensible to the impression of cold, and shivers when the surface is exposed to the air. He is sensible of some of the objects of touch, as he not only moans on handling the bruised parts, but is apt to have the stertorous breathing and spasmotic affection of the arms excited by the slightest impressions; as applying the finger to feel the state of the pulse or the temperature.

12th, 2, A. M.—Every symptom continues in the state described above. The pulse, though irregular, beats 115 in the minute, and is considered to be sufficiently firm to warrant the employment of venesection, or arteriotomy. About 16 ounces of blood were taken from the temporal artery, and the pulse has since become slower, but more irregular. There is less stertor of breathing, or spasm of the upper extremities.

“4, A. M.—The state of coma continues, and the pulse at the wrist is only felt as an obscure vibration, without any distinct beat. The stertor recurs at intervals as formerly; the extremities are warm, and the whole surface covered with a gentle diaphoresis.

“10, A. M.—No change in the symptoms since last report.

There is the same indistinct tremulous motion in the pulse at the wrist; has frequently since admitted passed urine, but has had no stool. Eight ounces more blood now taken from the temporal artery, with the effect of rendering the pulse perfectly distinct, though weak and unequal. There is also less stertor in the breathing.

“1, P. M.—Breathing continues calmer and easier, the spasmodic affection of the arms is less observable, and the beat of the pulse is indistinct, though weak and irregular; has had no stool. A purgative enema was administered.

“4, P. M.—The pulse continues very weak, but distinct; surface soft and rather moist; enema has been retained; breathing sometimes performed by the diaphragm and abdominal muscles only, without any motion of the parieties of the thorax; at other times, the ribs are alternately elevated and depressed, but without the appearance of much exertion. The purgative enema was ordered to be repeated.

“7, P. M.—The pulse more feeble, but still distinct; feet and ankles cold. The pupil insensible to the stimulus of light, remaining fixed on the approach of a candle. The enema was not repeated, as he had a plentiful stool, shortly after the last report. Bottles of warm water were applied to his feet.

“10, P. M.—Pulse not to be felt, respiration performed feebly, but in the manner formerly described.

“13th.—Died at 1 o'clock this morning.

“*Appearances on Dissection.*—On separating the integuments and tendon of the occipito frontalis muscle from the cranium, they were found to be discoloured by effused blood, particularly in that part covering the occipital and parietal bones, indicating the parts on which the injuries had been inflicted. When the top of the cranium was removed in the usual manner, leaving the brain invested by its membranes, a very small quantity of venous blood was found extravasated upon the external surface of the dura mater, immediately under that part where the external integuments had been lacerated by the violence; the quantity was only sufficient to spread over a surface of about an inch in diameter; it was immediately in the course of one of the branches of the posterior meningeal artery, going to a glandular looking body lodged in a small pit formed in the internal table of the cranium, and was probably poured out by the vein accompanying that artery. The dura mater was found to be separated from the bone for a very considerable extent, from above the line where the section of the cranium was made downwards on the hind part of the head, to near the margin of the foramen magnum; and laterally on both sides to the petrous portions of the temporal bones. The superior longitudinal sinus was laid

open, and only a small quantity of coagulated blood was found in its posterior extremity. The dura mater was now divided by a circular incision corresponding with the section of the cranium, the falk separated from its anterior attachments, and the upper part of the membrane turned backwards, exhibiting the two hemispheres of the cerebrum covered by the arachnoid coat and pia mater. The general appearance presented by this surface was a bright crimson blush uniformly diffused over the anterior and middle portions of both hemispheres. This uniformity, however, was interrupted in the lateral and posterior parts by the effusion of dark purple-coloured venous blood, which, in the more anterior parts, occupied only the spaces between the convolutions of the brain, following the processes of the pia mater to the bottom of their sulci, while more posteriorly the surface partook generally of this effusion of purple-coloured blood. On making a horizontal section of the hemispheres, parallel with the plane of the corpus callosum, the effused blood was found to have insinuated itself into almost all the sulci, and in one part of the anterior lobe of the right hemisphere, a small quantity of venous blood was found effused into the medullary substance. About one ounce of bloody serum was found in the right lateral ventricle, and in the left a small clot of coagulated blood was entangled in the plexus choroides. On turning back the corpus callosum, the inferior surface of that body was ragged and unequal, as if it had been torn from the subjacent parts by some very sudden and violent shock. The fourth and fifth cervical vertebræ were found to move on each other more extensively than any of the others; and in pressing these strongly together, during the time the motion was performed, a sensation of roughness was communicated to the hand; on removing the soft parts, however, over these vertebræ, no fracture could be found of any of their processes, or connecting surfaces. The interior of the spinal canal was not examined. It is proper to add, that, previous to dissection, the arteries had been filled by an injection of wax and vermillion, which may have contributed to, or even altogether produced, the fine crimsoned appearance presented by the pia mater, on the anterior and middle parts of the cerebrum."

In some cases of violent concussion of the brain from a fall, as where a dragoon is unhorsed in a charge, we find that the dura mater is very extensively detached from the bone, in the immediate vicinity of the point which has first struck the ground; and that throughout its whole extent it can be separated with the greatest ease, as if the head had been macerated. No surgical aid can be of any avail in such cases.

Schmucker very particularly dwells upon the appearance of

pulsation in the uncovered brain, in all cases of fractures or operations; and has observed that it rose and fell more on some days than on others; and this state of pulsation regulated his employment of the lancet. In the British army we have been guided more by other circumstances; but the observation of the Prussian surgeon should not be forgotten, as it is indicative of the increased action not only of the more superficial arteries on the surface of the brain, but also of those at its base, on the pulsation of which the alternate rising and falling of the cerebral mass depends; neither should it be lost sight of, that position may have a great effect on the appearance of the brain, if the dura mater is removed; for the depending posture, favourable to the accumulation of blood in its veins, often gives an appearance of turgescence in the living subject, and misleads as to the existence of inflammation, in our examination of the dead.

While I have given so many striking instances of either no ill effects whatever, or else a very slow approach of danger, and a remarkable delay of its actual occurrence after sabre and musket wounds, I must not omit to mention some of the more numerous instances where death occurs from these accidents; but I should very much deceive the inexperienced reader, did I lay down separate or invariable characteristic symptoms of each of those causes of fatality, which all seem to have a combined share in the event:—rigors, fever, stupor, derangement of the alimentary canal, affection of the organs of sight, hearing, and speech, and general affection of the whole nervous system,—come on either in succession or together, and cut off the sufferer. On dissection, the rupture of blood vessels, which can be traced by the knife or injection; general oozing, not referrible to any set of vessels; the effusion of purulent matter; the throwing out of layers of coagulable lymph;—all afford instances of pressure from fluids; while fractures and depressions; separation of the inner table, without any displacement of the outer; and a variety of extraneous bodies,—form the sources of pressure from solid matters. Besides these, abscesses, and even gangrene, are often detected making very extensive ravages in the substance of the brain itself; while sometimes it must be confessed that dissection fails in pointing out the immediate cause of the fatal event. Examinations after death have also frequently shown effusions of blood, fissures, and fractures, the existence of which had never been suspected during life; but which, if affecting the basis of the cranium, are universally fatal. The symptoms of these cases are extremely equivocal, and I am not aware of any which characterize them more than any other serious injury of the same kind differently situated, except the effusion of

brain from the external ear. The effusion of blood I have observed in several instances, but I have not found it necessarily fatal, which that of brain is *

The brain is not unfrequently injured, and some of its functions destroyed or impaired, by bullets passing below or close to its basis, and inflicting wounds belonging to the class of those of the face, though often supposed to be of the cranium itself. In all these cases, the prevention of inflammation and its consequences is the only rational attempt which we can make at cure.

Wounds of the head have attracted the attention of philosophers and physicians from the time of Hippocrates. His book on the subject is among the most interesting of his writings, and has greatly occupied the commentators, from Videlus Videlius, who published upon it at Paris, in 1544, down to Bernardini Falcinelli, whose commentary appeared at Florence in 1658. The authors of the Arabian school were not behind the Greeks in their investigations, and Lanfranc, Guy de Kauliac, and de Vigo, followed in their steps. But an author, in whose work all the knowledge of his predecessors will be found concentrated, is Jacobus Berengarius, whose treatise, "De Fractura Cranii," was published at Bologna in 1513, and has since gone through a variety of editions. Another author who has written a most interesting work on the subject, and whose memory has been rescued from oblivion by the learned and ingenious Scarpa, is Carcanus, or Carcano Leone: an epitome of his work is annexed to Scarpa's Memoir on the Cutting Gorget, translated by Mr. Wishart, Edinburgh, 1816. It is to the moderns, however; to Pott, Dease, O'Halloran and Abernethy, in these islands; and to Petit, Quesnay, and Desault in France, that we owe by far the most valuable parts of our knowledge; nor is the work of Schmucker, his "Chirurgische Wahrnehmungen," to be omitted. The cases and observations contained in it are the results of long practice with the Prussian army, and a perfect acquaintance with shot and sabre wounds, acquired in the field and at sieges. Many interesting cases of these injuries will also be found in a valuable paper by M. Bordenave, in the 2d volume of the Memoirs of the French Academy of Surgery, and in the different volumes of the "Journal de Medecine Militaire," edited by Dehorne, Paris, 1782, et seq. and the "Recueil D'Observations de Medecine Militaire," edited by Richard de Hautesierck, Paris, 1766, et seq.

M. Larrey

* See an account of Dr. Thomson's communications upon this subject to the Chirurgical Society of Edinburgh, in the Edin. Med. and Surg. Journal, vol. viii. p. 250.

and all the other French military writers abound in cases and observations on this important subject.*

CHAPTER XVII.

OF INJURIES OF THE EYE, EAR, FACE, AND NECK.

THE incised wounds of these parts require no peculiarity of treatment, except that the antiphlogistic treatment in wounds of the eye must be most rigidly enforced, and that in wounds of the ear and face, increased attention will naturally be paid to prevent irregular union and consequent deformity. In general, all the sabre wounds of these parts heal kindly.

The eyes suffer in various ways by gunshot wounds and explosions. The natural mobility of the organ, the frequent use which the soldier is obliged to make of it, without varying the position of his body, and the different attitudes in which he is placed in the loading, discharging, or aiming his piece, occasion a great variety in the angles at which the ball strikes the eye and passes along its orbit. After an action we meet with one or both eyes partially injured, or blown completely out; or the ball passing through the upper part of the nose, and leaving an arch; or removing it altogether; sometimes the ball passes behind them, destroying their power, either by cutting the optic nerves at once, or causing their subsequent inflammation and thickening. An additional proof of the decussation of these nerves is afforded by the effects of gunshot wounds of the eye; for in many instances an injury by a ball inflicted in the neighbourhood of one, produces paralysis of the other. Sometimes the ball enters straight forward, destroys the organization of the eye, and lodges in a variety of parts, in the brain, the orbit, under the zygoma, or in the soft parts, and sometimes its course cannot be ascertained during life. Pierre Roussillier, of the 25th regiment of the line, in the service of Napoleon, was

* A very valuable paper on "Injuries of the Brain," by Mr. Brodie, will be found in the 14th volume of the Medico-Chirurgical Transactions; and another by Mr. Rose, in the same volume, on the "Depositions of Pus and Lymph occurring in the Lungs and other Viscera, after injuries of different parts of the Body."

wounded on the 18th of June at Waterloo. The ball entered the right eye; the left, though not in the slightest degree injured to appearance, was completely blind. Rare, however, are the cases where death does not follow all wounds, particularly small punctured ones, going directly forward into the orbit, as this did. I felt under the zygoma and all along the neighbourhood of this poor fellow's wound, but the puffy state of the parts could not detect the course of the ball; he himself was confident it had gone into his brain: he returned to France convalescent. Garangeot (*Traité des Operations*, vol. iii. Obs. 20.) gives us an interesting case from the lectures of Petit, in which a soldier received a wound towards the great angle of the eye; it was deemed but of little consequence, and healed under the common hospital treatment. The man expressed a wish to leave the hospital, although cautioned by the surgeon, and had scarcely reached the door when he was seized with rigors, obliged to return, and died in two days. On dissection, the ball was found lodged under the sphenoid cells and the hole of the optic nerve. The effect on this man's sight is not mentioned.

In some cases the ball passes into the orbit without bursting the eye-ball, although the power of vision is totally lost. Of this I had a case at Elvas, which occurred during the siege of Badajoz, in 1812. It struck me at the time, as illustrative of the mode in which, by the resilience of their coats distended with fluid, the blood vessels often escape injury when balls pass close to them. A soldier of the 52d regiment was brought into the operation room at Elvas, some weeks after being wounded, for the purpose of having a ball extracted which gave him excessive pain, impeded his respiration, and obstructed his deglutition; it prevented his speaking distinctly, and kept up an irritation in his fauces, attended with a constant flow of saliva, and a very frequent inclination to vomit. On examination, it was found to be lodged in the posterior part of the fauces, forming a tumour behind and nearly in contact with the velum pendulum. It had passed in at the internal canthus of the eye, fracturing the bone; and, although blindness was the instant consequence, the globe of the eye was not destroyed; and the remaining cicatrix and very inflamed state of the organ were the only proofs that an extraneous body had passed near it.

In some cases much less injury is done to the eye than might be supposed: of this the following case, which occurred to Dr. Burton, then of the 36th regiment, now surgeon of the 66th, is an example:

CASE LII.

Of Musket Ball lodged under the Eye, without impairing Vision.

December, 1809.—During the retreat of Sir John Moore's army towards Corunna, the 36th regiment having been engaged skirmishing with the enemy in front of the town of Lugo, a soldier of the regiment, who was left to cook the company's dinners, whilst employed in that office, at the distance of about twenty yards in rear of a loose wall, of from two to three feet in height, suddenly fell backwards, and as I chanced at the moment to be employed near him, says Dr. B., I immediately ran to him, and found that he had received a wound running in a horizontal direction, under the left eye, above the orbital margin of the superior maxillary bone, as if made with a rough cutting instrument; very considerable ecchymosis took place, which was got rid of by pressure. I introduced a probe,—plainly felt a foreign body lodged in the socket, which was easily extracted by means of the common forceps. I found it to be a musket ball, flattened so much as to resemble a piece of money, the cause of which evidently was, its having first struck against a stone of the wall in front of the man. The eye did not suffer in the least, although he underwent a very distressing march that night in the direction of Corunna.

The following case, received from Dr. Pockells, is very interesting.

CASE LIII.

Injury of the Eye succeeded by Mental Derangement.

A hussar was wounded on the 18th of June, 1815, by a musket ball, which penetrated by the left temple into the orbit, and tore the globe of the eye from its cavity. The ball could not be found. The eye hung from the eye-lid, and appeared to be easily separated from the surrounding parts. The patient was insensible for the first few days, but recovered on being copiously bled. The wounds were simply dressed, and were cured in three months. The patient has, in part, lost the hearing of his left ear, and is constantly in a state of mental derangement, without being entirely idiotic. He has become very corpulent, an occurrence frequently observed after wounds.

Balls occasionally take their course through the superciliary ridge, and often penetrate through the lower part of the orbital

process, and go out under the zygomatic arch, or lodge in the antrum of Highmore, or in the nares; or, finally, pass out through the palate and into the mouth, or externally at the throat. Of this kind seems to have been a case which made a great noise many years ago, and obtained insertion in the Philosophical Transactions. The ball entered by the right orbit, and passed inwards. After a variety of exfoliations from the wound, nose, and mouth, and the formation of several tumours about the jaw, it was at last cut out (after thirty years' residence in the parts (near the pomum Adami.* Strabismus is not an unfrequent occurrence from wounds of this kind, so close to the neighbourhood of the eye, and from the passage of balls from one zygoma to another. I have observed also, but particularly in a French prisoner, Joseph Fleche, of the 51st regiment of the line, a fixed state of the eye-balls of both eyes, indicating a paralytic affection of their muscles, with a dilatation of their pupils; the dilatation was permanent; but, on some occasions, (not apparently connected with any external cause,) the globes of the eyes evinced a considerable share of motion; the sense of smell was entirely lost. No symptoms of injured brain followed this wound. But in a soldier of the 28th regiment, wounded in the same action, June, 1815, and same manner, but more below the zygoma, the head was violently affected; the smell was instantly and permanently lost; the hearing was impaired; but the sight of the eyes remained perfect throughout the cure, and so continued. A French prisoner, of the 63rd regiment of the line, had a ball passed through the right eye in a direction straight inwards, and lodged, site unknown. A total paralysis, both of the pupil and muscles of the *left* eye, ensued. In another, Dupré, of the 51st regiment of the line, the ball entered the right temple, at the upper part of the zygoma, and lodged. The sight of the eye was utterly destroyed, although the globe appeared quite perfect to a superficial observer. On looking carefully into it, the lower half of the pupil seemed to be separated from the upper by a transverse line formed by the edge of a floating mass, apparently coagulated blood. The upper half appeared as if occupied by an exudation of lymph. The pupil was so dilated, that scarce a trace of iris was to be seen; it was barely marked by a coloured circular line.

Diplopia sometimes, though rarely takes place from gunshot wounds in the neighbourhood of the eye. The following case occurred in a soldier of the 33d regiment at Waterloo:

* See Phil. Trans. abridged, vol. v. p. 204, or vol. iv. p. 14, Part II., new abridgment. For a case of a ball lodged in the Nares for 25 years, see Ephem. Nat. Curios. Cent. 10. Observat. 300.

CASE LIV.

Of Diplopia.

A. B. received a wound from a musket ball, which brushed along the root of the nose, and onwards towards the right eye-brow, but without producing any injury to the bone, and so little general derangement, that the wound healed in a very few days. Immediately on being struck by the ball, double vision took place. I did not see him until the wound was nearly healed. He then saw the double objects at the same moment, and both with equal distinctness. Nor did his shutting his eyes, and then suddenly opening and fixing them on the object, or viewing it in an oblique direction, occasion any variation in the appearance. He had been, I believe, a very dissipated subject, and abstinence, with occasional emetics, and cold Collyria, were recommended. In about two months the disease was removed, but on running into some excess of drinking, it returned again, and the wound burst out afresh: a recurrence to a more rigid regimen perfected the cure in a fortnight, and he was discharged entirely from the hospital.

Diplopia, and other derangements of vision, also take place in injuries of the head, where the eyes themselves are not at all originally affected. I have seen it in many cases of injuries of the head in various points, with and without depression of the bones, or inflammation of the brain, or meninges. In Mr. Hill's cases, we have a very curious, though short account of it.*—A man had been under his care for some time with a severe injury, affecting the head generally, but his friends, despairing of the possibility of saving his life, brought him home. Repeated attacks of fever, inflammation, and suppuration of the brain, took place. “When the inflammation was in the *fore part*, the candle appeared double; when *backward*, with a circle about it, but after the free eruption of the matter, the candle appeared single and distinct.”

I have met with one or two cases of amaurosis from wounds of the supraorbital nerve; the perfect division of the nerve produced no alleviation of the complaint, but after some time, the eye partially recovered. Scarpa doubts of the possibility of the cure of amaurosis from this case, and mentions Valsalva's case as the only one on record. Mr. Hey, however, states another in the *Medical Observations and Inquiries*, vol. v. M. Larrey mentions another, vol. iv. p. 181 of his *Memoirs*. Vicq

* Hill's *Cases in Surgery*, Case v. p. 108.

d'Azyr, who gives a case of amaurosis from a wound of this nerve, in the "Histoire de la Société Royale de Medecine," Année 1776, says, that he has since divided this nerve, in quadrupeds, but without producing any such effect.

In the unfortunate injuries of this delicate organ, very painful consequences ensue, and fungi to a great size, and of a most irritable nature, occasionally protrude. I have seen many gallant men driven almost to desperation by the agony they suffered, which nothing but large and frequently repeated doses of laudanum could subdue. The means which I would recommend are: First, if the globe of the eye is irreparably injured, as in almost every case it is, at once to evacuate the accumulated humours by a free and deep incision. By this means we sometimes are enabled to extract the bullet, if it lies in or near the orbit. The parts should then be covered with the lightest and mildest possible dressings, and with cold applications, although sometimes we find that warm fomentations, and sometimes cloths dipped in spirituous lotions, give most relief. Finely scraped lint, applied dry, will, in the lesser degrees of fungous excrescences, serve to repress them; but if they become troublesome, we must have recourse to a strong solution of nitrate of silver. If inflammation runs very high after one copious general bleeding, leeches should be applied, and continued, if the abstraction of more blood is necessary. I am convinced that mischief, rather than good, has been often done in the inflammatory affections of this insulated organ, by profuse general blood-letting.

In some instances the iris is disorganized by a blow, and sometimes it is partially torn away from the ciliary ligament, leaving a small chink, or artificial pupil, through which the light is admitted to the bottom of the eye. Often also small points of the sclerotica are absorbed, and appear as if detached grains of gunpowder were strewed over the globe of the eye; these accidents admit of no remedy; with them is to be classed a tremulous motion of the humours seen through the pupil at each motion of the globe of the eye, and which proceeds from a dissolution of the humours, and a flimsy ragged state of the iris itself. The pigmentum nigrum is sometimes forced off in small masses, and lodged in the anterior chamber, where their presence gives rise to the sensation of "muscae volitantes;" by time they are absorbed, and this sensation is removed. Cataract also often follows wounds of the eye.

The bony circle, forming the exterior part of the orbit, is often the seat of gunshot injuries, particularly the superciliary ridges, the frontal sinensis, and generally the whole of the bone in which they lie; and, I may here take occasion to confirm an observation made by the accurate Pott, as far as has come within my own experience, that the injuries of "this bone are, by no

means, so commonly dangerous or fatal as those affecting other bones of the cranium." Universal experience has now pointed out the safety and facility of trepanning every part of it, including the sinuses, in which balls are frequently seen completely buried, with extensive depressions of the inner table, which nothing short of the operation can remove.

Almost all the systematic writers treat on the wounds of the eye incidentally. Paré has dedicated a chapter to them in his 10th Book. Cæsar Magatus, in his valuable work, "De Rara Medicatione Vulnerum," also treats on them; but Bohn, in his very useful little volume, "De Renunciatione Vulnerum," has not mentioned them; although in this work, and that of Magatus, already referred to, information on the injuries of almost every organ and part of the body may be met with. Ravaton and Percy give some observations upon the wounds of the eye; and a variety is accurately enumerated by Dr. Thomson, in his "Report." I am not aware of any monograph upon the subject.

INJURIES OF THE EAR.

The ear is the subject of gunshot wounds as various as the eye, in their course and in their effects. The mastoid process is injured sometimes in its whole extent, and sometimes only partially bruised; the balls, passing about it in every possible angle, and sometimes appearing even to enter the external meatus itself. At all events, injuring the bony circle primarily, and in its consequences implicating the more internal bony sides of the auditory canal, and small bones of the organ, in suppuration and caries. These cases are attended with more or less deafness, great pain, frequent spasmotic affections of the face, and an intolerable fetor in the discharge; and are sometimes followed by death from inflammation spreading to the brain. Open bowels, abstinence, and strict attention to cleanliness by tepid injections, are particularly called for on these occasions.

The function of hearing is sometimes greatly impaired by the passage of balls near the head, but I have met a case where the external ear was completely removed by a cannon ball, and yet the sense of hearing is as acute as ever.

Paré gives a very short chapter in his 10th book on the incised wounds of the ear; Hildanus gives some observations on the deafness produced by the explosion of ordnance; and Senner-tus dedicates the 5th chapter of his first book to the wounds of this organ. I am not aware of any special treatise on the subject.

The sabre injuries of the external ear are very simple; even

when almost separated, this organ has adhered again by proper treatment.

As a measure of safety which prudence dictates, and experience fully justifies, in every wound connected so nearly with the brain as those which I have been speaking of, a mild course of mercurial physic should never be omitted, with the rational view of completing the absorption of any effused fluids or depressed bony points, that may still remain within the cavity of the skull, and lay the foundation of future mischief; and also to relieve the sympathizing viscera, particularly the liver, on the discharge of the functions of which so much of the health of our patient depends.*

INJURIES OF THE FACE.

Wounds of the face attract our attention more particularly from the deformity with which they are attended, than from any peculiar danger consequent on them, the great vascularity of the part favouring their union as soon as the danger of hemorrhage is over. Those from sabre cuts, although the most horrible on first appearance, yet by the judicious use of adhesive straps and sutures, and by the proper application of supporting bandages, are frequently healed without much disfiguring the patient, especially where the parotid duct is not divided.

CASE LV.

Severe Sabre Wound of the Face.

A most remarkable instance of this occurred to Captain De H—— at the battle of Waterloo. My friend Staff-surgeon Dease dressed him on the field, and sent him into Brussels to my care. The wound was from a sabre, which struck him nearly across the eyes, one of which it destroyed, and cut obliquely inwards and outwards, so as to admit of a view of the pharynx. In the multiplicity of engagements, I did not see him for several days, and not before a Belgian barber had cut out the ligatures, and removed the straps by which the lower portion of his face was kept in position, and had stuffed the parts with charpie. This officer recovered, granulations spouting up at all points, and the deformity is by no means so great as it was

* See some valuable remarks on this subject, in 2d volume of Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, by Sir Gilbert Blane; and Cases in 4th volume of the Medico-Chirurgical Transactions, by Dr. Hutchinson.

natural to apprehend it would have been, the parts having been again brought into apposition by straps and bandages, but with great pain to the patient, and consequent delirium. The hiatus was so great, that Mr. Dease was on this occasion obliged to support the upper jaw by morsels of cork put into the mouth, in such a way as to act as fulcra, but admitting of the passage of liquid nourishment. The cicatrix now forms one right line from ear to ear, the soft parts united, but the bones not. This soft union occurs also sometimes in the lower jaw.

Injuries from musket balls, although at first of little apparent consequence, are eventually productive of great and disgusting inconveniences; and those from fragments of shell or round shot often communicate their effects to the brain, particularly if they fracture the malar prominence and parts adjacent, while, if they injure the lower parts, the organs of speech, and of mastication are seriously and sometimes irrecoverably affected. Great secondary injury is produced by the frequent exfoliations of bone, and deep-seated formations of matter, occasioned by a musket ball passing through or shaking the bones of the nose, or penetrating the maxillary sinuses, the effect of which may be felt for years. The balls often get partially split and entangled among the irregular shaped bones forming the face and upper jaw, resisting all attempts at removing them for years, until they have produced by their irritation large puffy tumours, extensive ulceration, and caries in the bones, and sloughing of the mucous membranes which invest them. In all cases where it is at all possible, the extraction should be made *internally*, to obviate deformity. Spiculi of bone will long remain after the ball is extracted, which give rise to great irritation in the fauces and nostrils, through both of which they for months continue to be discharged, affecting the organs of taste and smell in a very unpleasant manner.* Loosened teeth also form a great source of irritation, and should be removed as soon as possible. I have never seen the attempt to save them productive of any ultimate good. In some cases, the ball has passed obliquely downwards through the antrum, and has driven the tooth before it, or has lain upon, and subsequently loosened it, and has itself been readily extracted afterwards.

The tongue often suffers from the passage of balls through the mouth, or from bayonet thrusts, and will often heal without any bad consequence, if not too much interfered with by art. Indeed, it is astonishing how little beyond simple dressing, quiet, and abstinence, is required in the most serious-looking pene-

* In the case of a general officer, in which I was consulted for a circumstance of this kind, I recommended the use of prepared charcoal snuff, which was employed with considerable relief.

trating wounds about the mouth and cheeks. The elastic nature of the soft parts forming the cheeks, admit of their being brought into close apposition by art, even where there is a large destruction of them; but it becomes a very different matter if the bone, particularly the lower jaw, is either simply fractured, or has sustained a loss of substance throughout. The powerful, opposite, and frequently excited action of the muscles inserted into it, render it difficult, if not impossible, to prevent great deformity.

Wounds of the tongue often heal with great rapidity. Its functions are found, on after examination, to be injured in proportion as the nerves which form the organ of taste, or those which supply its muscles, are injured. Thus, I have seen some cases where, after a gunshot wound had been long healed, the patient has lost the sense of feeling and of taste on one side of his tongue, and occasionally on both, while he could speak and masticate, and perform other motions with that organ nearly as well as before his accident.

The following case occurred to my observation while examining the invalids who presented themselves at Edinburgh on a levy of out-pensioners.

CASE LVI.

Injury of the Tongue and singular Course of a Ball.

William Fulton, of the 1st regiment of foot guards, received a wound from a musket ball in his upper lip, at the siege of Bergen-op-zoom in the year 1814; it struck him nearly under the centre of the columna nasi, as he was ascending a scaling ladder. The ball carried away six teeth of the upper jaw, penetrated the tip of his tongue, and passed out exactly above the upper part of the thyroid cartilage of the left side; it then, in its farther progress, re-entered at his neck, penetrated the sternal portion of the left sterno-cleido-mastoideus muscle, passing under the skin in a course directly downwards, and lodging in the sternum at the distance of about three inches from the point where it last entered;—it was cut out almost immediately.

On receiving this wound, the man immediately fell from the ladder, with a sense of excruciating pain in, and loss of motion of his tongue, at the same time a violent hemorrhage occurred from the orifice over the thyroid cartilage. It was five months before his wounds were perfectly healed.

I examined Fulton in December, 1819. He then complained of a constant sense of coldness in the *left* half of his tongue, which is drawn to the *right* side of the mouth; his lower jaw

was very powerless; in other respects, he was in good health, and the sense of taste was not at all impaired.

In some horrid cases, where the lower jaw is swept away by a cannon shot, life has been preserved by the endeavours of art, aided by a sound constitution; but, in general, the patient sinks under the accumulated tortures of his situation.* It is still, however, our duty to try every expedient; and, after the ragged parts and splinters of bone are removed, the vessels within reach secured, and the suppurating process fairly established, we may endeavour to assist nature, faithfully following any effort she may make to fill up the chasm, but without allowing ourselves to count upon a showy or complete cure. By strict attention in this way, I saw a horrid-looking case, where nearly one half of the face was carried away by a round shot at Waterloo, in very fair progress of contraction, under the care of my friend Staff-surgeon Roach.

In injuries of the lower jaw-bone, if the fracture is not complete, little more need or can be done, than removing the splinters and loose teeth, and taking away exfoliations, to which it is particularly liable. If the bone is fairly divided into two portions, the best chance of avoiding great deformity is to apply the lower jaw closely in contact with the upper, which, in this case, must be viewed in the light of a fixed splint, supporting the part by a properly adapted roller, with a compress over the fractured points, and giving the patient the strictest injunctions to keep his mouth closed. His food must be altogether fluid, and his wants and wishes conveyed on paper, or by signs.

The various nerves that may be injured in wounds of the face, give rise to a great variety of paralytic and spasmotic affections and distortions, which do not come within the power of art to remedy. I have seldom met hemorrhages about the face that were not very readily relieved by the ligature of the small vessels, or graduated pressure applied either to the wound or along the artery implicated; still less have I observed any requiring the experiment of tying the carotid trunk, although such necessity has occurred to others.† In simple incised injuries of the parotid duct I have in a few instances derived advantage from making the division complete by a clean incision across and into the mouth, and closely bringing together the

* M. Larrey's case of Louis Vauté is so curious, and so amply illustrative of the powers of nature, seconded by art, that I beg to refer to his book, now translated by Mr. Waller, surgeon of the navy, p. 130, where the ingenious mode of feeding the patient through an elastic tube, and of covering his deformity afterwards, by a metallic mask, are fully shown.

† See Medico-Chirurgical Transactions, vol. vii. paper by Staff-surgeon Collier. I witnessed the cure, though not the operation. It appeared perfectly complete.

edges of the wound on the outside of the cheek. The natural flow of the saliva into the mouth has rendered the wound on that side (with the occasional aid of a little lunar caustic) indisposed to fill up. We are, however, often disappointed in this fortunate result, particularly after gunshot wounds, and a constant dribbling, with depositions of tartar around the wound, succeeds. Pressure upon the duct, so as to obliterate it, or at least to obliterate its point, has been proposed, but the practice is very dubious; excruciating pain and immense swelling of the parotid gland, with a general œdema of the neighbouring parts, almost constantly succeeding. An ingenious proposal has been stated and practised by the French surgeons to prevent the uncleanly dribbling of saliva, viz. the obliteration of the secreting gland altogether, by compression. This, it is said, is done with perfect safety, and the other gland completely supplies its place by an increased secretion. I have never tried the experiment; but I doubt the fortitude of patients in general to bear the necessary pressure.* The operation of the seton, usually recommended in systems of surgery, I have not employed.

Wounds of the nose by sabre cuts should be placed in as favourable a situation as possible for adhesion; or if the cartilage is much injured, the nostrils should be kept properly dilated with a canula, sponge, or charpie, so as to preserve the rotundity of the passage, while the parts are compressed inwards by proper bandages, &c. I must refer to Mr. Carpe's work on the subject of the formation of a new nose, in cases where the original one has been cut off, for details as to the practice to be adopted; but I may remark, that I served in the same corps with one of his patients, who lost his nose from the employment of enormous quantities of mercury, administered for an affection of his liver; without the smallest reason to suspect the existence of a venereal taint.

Fragments of bone and teeth are sometimes driven far into the sound parts; and if the fauces or tonsils are engaged, great irritation follows. A very curious case of this kind is now before me, which I hope my friend Staff-surgeon M'Leod of the York Hospital will give more at large. An officer had the lower jaw fractured, and several teeth knocked out, at the storm of St. Sebastian. After a variety of sufferings, he is now in perfect health, and serving in the army; but in the posterior part of

* See Desault par Bichât, tom. ii. p. 218, and Gariot, *Traites des Maladies de la Bouche*, 8vo. Paris, 1805. The gland itself has been operated upon by Dr. Palmer, *Medico-Chirurgical Journal*, vol. i. p. 457; and by Mr. Goodlad, *Medico-Chirurg. Trans.* vol. vii. Part i. p. 112. See also a paper by Mr. Percy, *Bulletin de la Faculte de Medecine*, 1811, No. 3. For some valuable observations on the subject, I would particularly recommend the study of Burns on the *Surgical Anatomy of the Head and Neck*, Edinburgh, 1811.

his fauces there is lodged a substance, whether a fragment of jaw-bone, or a tooth, cannot be now determined, around which an extensive osseous mass, perceptible to the eye, and to the probe, is thrown out. A recollection of Mr. Hunter's experiments on the transplantation of teeth incline me to the supposition, that a tooth is the nucleus of this deposition.

Paré gives a few short notices on wounds of the face, and its different parts, in his 10th book; and Wiseman treats of them in his 5th. Ravaton gives some instances of external injuries cured; and Deschamps, in the 3d vol. of the *Journal de Médecine Militaire*; and Bouillard, in the 4th vol. of the same work, give two remarkable cases; the first of a transverse sabre wound, opening the frontal sinus and lachrymal canal; the other of a longitudinal wound, from the same weapon splitting the face from the root of the nose to the bottom of the chin. Both these extensive wounds were healed by proper bandages, and adhesive straps, without the use of sutures. Simon published at Paris, in 1765, upon the diseases of the tongue, in which he gives an instance of gunshot injury of it. Pibrac, in the 3d vol. of the *Mémoirs of the Academy of Surgery*, proposes a species of pocket bandage for the wounds of the tongue, more curious than useful. In the same vol. Duphenix, Morand, and Louis give some excellent observations on the fistulæ of the salivary canals; and in the 5th vol. of that great work, Bordenave has afforded several instructive instances of injuries of these parts.

INJURIES OF THE NECK.

It is only from a consideration of the parts of the neck, as they form one complete and sympathizing whole, that we can derive any rational views of the symptoms that may occur from its injuries, or any satisfactory explanation of them after they have taken place. The close and intimate connexion of the great vessels and nerves, and of the canals leading to the thorax and abdomen, are such, that separate views of their affections, however they may carry the appearance of minute accuracy along with them, are more the objects of speculative calculation in the closet, than the results of actual experience, and can seldom be of any practical utility in the field or hospital.

Simple incised wounds on the back of the neck, although sometimes penetrating to a great depth, and even uncovering the vertebral arteries, are not beyond the reach of simple bandage, and retention by adhesive straps and sutures; feebleness of the extremities, particularly the lower, are a more frequent source of complaint in these cases than hemorrhage.

In the simple superficial gunshot injuries, no peculiarity of

treatment is required; wounds which penetrate are, however, productive of great distress, and very high degrees of inflammation, the immediate or consequent effects of which spread far and deep, and, besides the immediate lesion, draw into sympathetic action all the adjacent parts. Hence arise restlessness, oppressed breathing, cough, nausea, and great irritability of stomach, with various nervous affections, as aphonia, hiccup, globus hystericus, and spasmodic twitchings of all the neighbouring parts, from general affection of the complicated and communicating nervous distributions throughout the cervical isthmus. Loss of power of the arm of the affected side is also a very common occurrence in those cases, either instantaneously, or at a more remote period, as the cervical nerves going down to form the axillary plexus may be affected primarily, or at some time after the infliction of the wound; and all these symptoms are accompanied by severe hemorrhages, which are always violent, and but too often fatal, life being generally extinguished in one or two pulsations of the heart, if the great vessels are injured; but if the secondary, or still smaller class, pour forth their blood, their natural retraction, or the fainting of the patient, admits of surgical aid, or so far subdues the disposition to subsequent inflammation, that life may be saved. I omit saying any thing on the wounds of the jugulars, or carotids; gunshot openings of them I hold to be so universally fatal, that any exceptions may be looked upon as merely serving to confirm the general rule.

The principles already laid down when speaking of first dressings, and treatment of wounds in general, are equally applicable in the cases we are now considering; it is unnecessary to recapitulate them, or to enter at large into all the varieties of injuries of the neck; but as the following case exhibits a combination of most of the circumstances that occur in severe gunshot wounds of that part, I shall offer it as illustrative of the general doctrine, and the practice in those cases.

CASE LVII.

Of Severe Gunshot Wound of the Throat.

My friend, Lieut. Col. A. C. received a wound from a musket ball on the evening of the 18th June, at Waterloo. The man who fired at him was so close, that he could perfectly well see him, the distance probably about 70 yards. On receiving the shot he instantly dropped, not however, perfectly senseless, but very much stunned. He felt as if he had received *three* distinct wounds, the most severe of which he referred to the arm of the wounded side,—the two others, of nearly similar severity,

to his throat and stomach. He was carried to the rear, where a light dressing was applied by a hospital assistant, and a very copious bleeding employed. He was then sent into the city of Brussels, where he arrived at two in the morning. On his arrival I was called to see him expire; and, truly, I did not suppose he could possibly survive till daylight. The ball had entered the sternal portion of the sterno-cleido-mastoideus of the left side, about an inch above its origin, and had passed inwards towards the thorax; but no trace of its route could be discovered. The wound had obviously discharged an enormous quantity of blood, which also gushed copiously from it at every effort to cough or vomit; symptoms which recurred at intervals of ten minutes, and distressed him most severely; and which had as I afterwards found, taken place almost on the instant of his wound. His left arm hung nearly lifeless, with a pulse scarcely perceptible; that at the sound arm was excessively quick, 120 in a minute, and feeble. I did not judge it prudent to do any thing for him that night; and one of the assistant-surgeons of his own corps arriving next morning, in whom the greatest confidence could be placed, he was left in special charge of him, with directions, on any appearance of rising inflammation, to bleed copiously, and to keep his bowels open, and the skin perspirable.

On the second day, when the bustle, consequent on the arrival of the wounded, had subsided, I called upon him, and, much to my surprise, found him comparatively calm, sensible, and free from any pain in the wound; but, with such an oppression about the serobiculus cordis, and, indeed, all along the course of the diaphragm, that he urged me to cut for the ball, as he was certain, he said, it was the source of his pain. He even laid his finger upon a spot below the right scapula; but after examining the part minutely, I could see no justifiable motive for hazarding an incision. He spit up a florid frothy blood very copiously, and the same issued occasionally from the wound. The efforts to vomit, and spasmodic catchings of the throat, with globus and hiccup, were very severe. He had passed frequently and copiously, during my absence, a pale, limpid, inodorous urine; his pulse, however, and his general appearance, were improved. During the course of this night, the pulse rose so high, and dyspnœa came on to such an extent, that twenty-four ounces of blood were taken from the arm.

Third day, symptoms as before, the belly did not answer sufficiently to the enemas ordered, and he had, in consequence, a saline purgative draught, which operated moderately; but towards evening the pulse rose, the pain became torturing, the dyspnœa almost suffocating, the nervous symptoms ran very high, and another copious bleeding of twenty-four ounces was had recourse to, with relief.

On the *fourth day*, a new symptom was superadded; his voice, which we had directed him not to employ, except on the most urgent occasions, was now lost altogether, and when addressed he pointed constantly to the course of the recurrent nerves, so as to convince us that an affection of them was the cause of this privation. His other symptoms, if not better, were certainly not worse. As he had not closed his eyes in sleep since the receipt of his wound, he had an anodyne this evening of tinct. opii gtt. xxv. vin. antim. gtt. xv. from which he had some refreshing slumber. On the *fifth day*, the cough and spitting of blood lessened much, and the retchings were less frequent; urine copious, and limpid; bowels free.

On the morning visit of the *sixth day*, I found the haemoptysis altogether gone; but on the night of that day his sufferings were dreadful, the vomiting, dyspncea, globus, and universal uneasiness and restlessness, rose to a pitch almost intolerable. His face was extremely flushed, and almost purple. His pulse got up to 130, hard, and bounding; carotids throbbing violently. Thirty ounces of blood were taken during the night, but with little relief till towards morning, when I found him bathed in perspiration, which was encouraged by acid diluents, and the occasional exhibition of the liq. ammon. acet., with a few drops of vin. antim. He continued rather easier for the two succeeding days, when the symptoms becoming again violent, he was copiously bled to twenty-four ounces, from which he derived immediate ease. The blood on this, as on all the former occasions, exhibited a thick buffy coat. From this day his recovery of voice, strength, and appetite, and the removal of all his painful symptoms, became progressive, and only interrupted by occasional costiveness, or some trivial symptom, easily removed. His regimen was most rigidly abstemious, and his drinks diluent, and moderately acidulated.

On the *thirtieth day*, while asleep, he was seized with a violent vomiting, which came on in convulsive jerks, by which such quantities of acrid bilious matter were thrown up, that he was nearly suffocated. His speech again became suddenly affected, and he uttered several incoherencies, of which, however, he was sensible; and, as he himself expressed it, after his paroxysm was relieved, (by draught of ether and tincture of opium in some aqua pimento,) "his tongue would not obey his reason." His arm, which had, after the first twenty-four hours, given him occasional uneasiness, and in which he felt a prickling sensation on the inner side, was particularly painful at the period of this spasmodic attack. It had been wrapped in flannel, and gentle friction had been employed to it; but, upon examining it more particularly, it was found somewhat shrunk, and the fingers cold, and nearly insensible to pressure. At this

period, the wound, which was simply covered with an emollient ointment, was perfectly healed; but no trace of the ball could be discovered, although the colonel positively averred that it was below the scapula. On the *thirty-first day*, the arm was not so painful; his spirits were excellent; his appetite craving, and he began to move about. In a few days he was able to visit his wounded brother officers in the neighbourhood; and, before the expiration of July, he received leave of absence to proceed to England. By a subsequent personal communication with him, I found that his health had gone on progressively improving.

M. Larrey recommends immediate free scarification as a means of preventing the paralytic nervous affections consequent on wounds of the neck, which he conceives prevents irregular adhesions of the lacerated nerves to the cicatrix. In such cases as I have related, the nervous affection evidently proceeded from sympathy of the cervical nerves which form the axillary plexus of the phrenic, and, perhaps, of the par vagum, where no operation could be attempted.

The dressings on those occasions ought to be light, and the approach of inflammation most assiduously watched; but I would recommend great caution in the employment of antimonials, which we find so useful in other cases, where the rigid antiphlogistic plan is to be enforced. Their emetic or nauseating effects render their use at least ambiguous; and, although they had no unpleasant effect in Colonel C's. case, I confess I should not use them again in such another.

Cases have occurred where balls have passed between the trachea and the carotid artery, and where an aneurism has been formed. Acrel, in his cases,* mentions an instance of the kind, where the cure was completely effected by pressure in the course of six months.

Wounds of the larynx and trachea, if unconnected with any of the neighbouring parts, or not attended with much hemorrhage, are not peculiarly dangerous, although they are very slow at times in healing. In the upper part of the tube the cartilages sometimes become ulcerated, and throw out large fungous excrescences, and hoarseness amounting almost to complete aphonia, takes place. Emphysema is also a frequent, though not a dangerous symptom of wounds of this description; indeed, I have met with it oftener in wounds of the larynx and trachea than in those of the lungs, probably because the action of the muscles subservient to respiration is exerted in such a manner, as to send a current of air through the larynx, whence it is

* Chirurgiske Handelser, 8vo. Stockholm, 1778.

driven forcibly into the cellular substance. Simple puncture is, in these cases, the best remedy.

In some cases of injuries of the trachea, inflammation takes place in such a high degree as to spread by continuous sympathy to the lungs themselves, and produce very aggravated forms of pneumonic affection, and is often succeeded by a slow, wasting, and painful disease, in many points and symptoms strongly resembling phthisis pulmonalis. Dissection, in these cases, shows inflammation, thickening, ulceration, and erosion of the cartilages, frequently with concretions resembling spongy bone thrown out on their surface. In a successful case of tracheotomy, performed at Portsmouth by Drs. Denmark and Johnson, a large mass of this nature was ejected by coughing, and several of a similar kind were removed from the wound. Instances also have occurred where, from a severe blow, some of the rings of the trachea have been burst, and fatal emphysema has been produced.

In dressing and examining these patients, we often find, when great delicacy is employed, that the irritation is invariably greater than when less ceremony is used; and it would be well always to keep this in view on applying remedies to the irritable internal parts about the throat. A moderate sized morsel of sponge immersed in our caustic solution, or whatever else we may use to the sore, will give infinitely less irritation than the more gentle, but more titillating camel hair pencil; and on the same principle, a lump of food, conveyed by a tube or funnel, will be more easily sent into the stomach than a more delicate fluid injected by a siphon. The use of opiates is of great use in these cases to allay the irritation of coughing, &c.

Wounds of the œsophagus in themselves are not peculiarly fatal; but, in common with all other wounds about the throat, the connexion of that part with many other important organs, makes them highly dangerous; I have met with but a very small number, and I proposed treating them on the same principles as I would those of injuries of the intestinal canal. All were from gunshot, and all died from hemorrhage and severe irritation, long before I could try the use of the flexible tube, in supplying them with food. Emphysema took place in one of these cases.

The following highly interesting case of severed larynx and wounded œsophagus was communicated to me by my friend, Dr. Johnson of Portsmouth, now of London.

CASE LVIII.

Of Wounded Larynx and Oesophagus.

“In the year 1805, while in sick quarters at Prince of Wales’s Island, in the East Indies, Mr. Stewart, an army surgeon, and myself, were called up in the night to a man in the suburbs of George Town, who had just been wounded in a dreadful manner in the neck. On arriving at the spot, we found the poor fellow weltering in blood, with an extensive wound across the throat. Having secured two or three arteries, which were still throwing out blood every time that the man recruited a little, we examined the injury more accurately, and found, to our surprise, that the larynx was completely severed between the thyroid and cricoid cartilages; and, moreover, that the oesophagus was laid open throughout half its calibre. We learned that this man, who was a Malay, had been playing at a game of hazard till late at night with another Malay, from whom he had won several dollars. This so provoked his comrade’s ire, that following him to his abode, and marking the place where he lay down to sleep, which was before the door, in the open air, he first swallowed some glasses of arrack, and then leisurely cut his comrade’s throat in the shocking manner related, with a large knife.

“I confess we were at a loss what to do; for, when we attempted to close the wound, he could not breathe at all. We therefore left it open, keeping his head reclining forward, and expecting that he would soon be suffocated. This did not happen, however, for he breathed very well through the wound; but his greatest suffering proceeded from thirst, as every thing he attempted to swallow came through the opening. We tried to introduce liquids through a flexible tube, but we succeeded very badly, on account of the great irritability of the fauces, trachea, and oesophagus. As there was great abundance of milk to be had, he was put into a bath of this fluid several times a day; and glysters of various nutritious liquids were assiduously thrown up. By these means, he was entirely supported, during the space of eighteen days, and nothing but common dressings were applied to the wound. At the end of this period, the oesophagus became retentive when liquids were taken; and the breathing was beginning to be partly carried on through the mouth. From this time he rapidly recovered, excepting a considerable loss of voice, and power of articulation.”

A curious case is recorded by the learned and accurate Mr. Percy, *Manuel de Chir. d’Armée*, p. 118, which occurred at

the battle of Fontenoy, where a ball had entered the oesophagus close to the thyroid cartilage. No search after it was ventured upon, but on the 16th day it was passed by stool.

I am not acquainted with any monograph upon wounds of the neck. Paré employs the 29th chapter of his 10th book upon them. Wiseman gives only one case, and that of little interest and Mr. John Bell confines his observations to wounds, voluntarily inflicted and penetrating into the mouth. An interesting case of a wound of the neck, succeeded by hemiplegia, and another of a gunshot wound of the throat, succeeded by paralysis and convulsions, is given by Forestus in his *Surgical Observations*. Another, with loss of motion in the arm from a wound of the neck, is to be found in the *Edin. Med. Essays*, vol. I. And in the *Med. Commentaries* by Dr. Duncan, vol. iv. p. 434, and vol. viii. p. 356, are two very interesting cases. Mursinna, one of Schmucker's successors, in his "*Medic. Chirurg. Beobachtungen*," relates a case of removal of the thyroid gland by a cannon ball; the patient survived fourteen days, and died of dysentery. Richard de Hautesierck gives an interesting case in the "*Recueil d'Observation*," &c. vol. i. p. 48, where several nervous symptoms followed exposure to cold after a wound of the neck; and Verdrier, in the third vol. of the *Memoirs of the Academy*, p. 67, gives a very curious case of a wound of the throat, and another of the abdomen, in the same subject. Wounds of the oesophagus, as well as of the stomach and bowels, often remain open for indeterminate periods. I shall have to give some instances of the latter, when I come to observe upon wounds of the abdomen. Trioen, in his "*Fasciculus Observationum*," Leyden, 1745, p. 40, gives us an instance of the oesophagus remaining open after a severe gunshot wound, in which also the larynx and trachea were implicated. Staff-surgeon Bruce gives a very interesting case of a wound of the oesophagus in the *Medico-Chirurgical Journal*, vol. i. p. 369. The *Essay on Oesophagotomy*, by Guattani, in the third vol. of the *Memoirs of the Royal Academy of Surgery*, 4to. edition, is very well worth consulting. A work of great value on the subject has been published in German by Eckholdt.

CHAPTER XVIII.

OF WOUNDS OF THE THORAX.

THE obscurity which attends wounds of the head, and renders their pathology so ambiguous, does not exist in an equal degree in those of the thorax. Its injuries are more cognizable to the senses; the operations required for their relief have nothing peculiarly dangerous in them, and the necessity for performing them is often clearly indicated by the symptoms; yet, with all these circumstances in favour of the patient, and in aid of the surgeon, the wounds of this division of the body are frequently as fatal as those of the head itself. Like them, too, they naturally divide themselves into those of the investing parts, and those of the parts contained; but the leading point to be attended to, is the great and dangerous hemorrhages that may arise from them. Another point of resemblance between wounds of the thorax and head, is the lodgement of extraneous matters within their respective cavities, without producing immediate or eventual ill consequences. In the examinations of the bodies of soldiers who have died from those injuries, I have frequently found pieces of wadding, of clothes, spicula of bone, and balls, (and, in one case, some charpie used as a dressing,) either loose in various parts of the lungs, or lying in sacs, which the exertions of the constitution to free itself, had thrown round them by the medium of coagulating lymph. In the more fortunate few who have recovered, these matters have been discharged from the wounds, or extracted from them by the surgeon. In some lucky cases, they have been ejected by the convulsive efforts to cough, which their irritation has occasioned.

In speaking of extraneous bodies generally, I have shown how often a ball, striking the body, or a limb, will run round under the skin, and appear to penetrate right across the member or the cavity. By the deep-seated course which balls sometimes take, the deception is rendered still greater. Thus I have traced a ball by dissection, passing into the cavity of the thorax, making the circuit of the lungs, penetrating nearly opposite the point of entrance, and giving the appearance of the man having been shot fairly across, while bloody sputa seemed to prove the fact, and, in reality, rendered the same measures, to a certain extent, as necessary as if the case had been literal

ly as suspected. The bloody sputa, however, were only secondary, and neither so active nor alarming as those which pour at once from the lungs when wounded. There is also another source of deception as to the actual penetration of balls into the cavities or the limbs; this is, where they strike against a handkerchief, linen, cloth, &c. and are drawn out unperceived in their folds, a peculiarity which has not escaped M. Larrey, who gives an interesting notice on it in the "Bulletin de la Faculte de Medecine," Paris, 1815, No. 2. I have also given an instance in the preceding pages. (P. 50.)

The following case proves, that a much larger mass than a bullet will pass even through the lungs, without producing death:

CASE LIX.

Extraneous Body passed through the Thorax.

A soldier of the guards was wounded through the thorax at Waterloo, between the 3d and 4th ribs of the right side. On his arrival at Brussels, he was placed in a hospital and dressed by Assistant-surgeon Reid of the 25th regiment, who has favoured me with the case. Nothing remarkable occurred for the first five days; and the only singularity in the appearance of the wound was its large size, capable of admitting three fingers conically placed. Blood and air were freely discharged from it. On turning the man to examine him and renew the dressings, a tumour was discovered on the scapula, from which was extracted his breast plate, about two-thirds of it rolled up by the force of the blow into a figure somewhat resembling a candle extinguisher, with the musket bullet contained within it; the other third was broken off, but had also passed through the wound and was extracted. This man survived for three weeks, with great hopes of his perfect recovery; but on some sudden gust of passion, to which he was very liable, he tore the dressings off his wound one night, and was found dead the next morning.*

Balls have been found in the substance of the lungs after a residence of twenty years there, the patient preserving a perfect state of health, and no peculiarity of symptoms denoting

* He was carried to the dead-house, and Mr. Reid had no opportunity of inspecting the body. Drs. Thomson and Somerville were shown the breast-plate, but the man would not part with it, and after his death it was not to be found.

their site.* There are on record, instances where the ball has rolled about in the cavity on every motion of the body. These cases are briefly stated by Mr. Percy, whose work is one of vast interest on the subject of extraneous bodies, and may be seen at large in *Mangetus*.† But it must be observed, that these are deviations from the usual course of nature; for the irritation of an extraneous body either leads to adhesive inflammation or thickening of the parts around it, and it is thus shut out, as it were, from the system; or an involucrum of coagulable lymph is thrown out, vessels shoot into it, and a sac is formed. Where balls have lodged in the cavity of the thorax, Larrey recommends removing a portion of the upper edge of a rib, with the lenticular, so as to avoid the intercostal artery, and thus to make room for the extraction of the foreign body; this operation he has performed with success. (*Memoires*, vol. iv. p. 259.) The ball, however, generally fractures the rib so extensively, as to admit of its being removed by the orifice through which it entered, which may, if necessary, be enlarged; in the 3d vol. of the *Medical and Surgical Journal*, p. 353, an interesting case is given where an iron ball of three and a-half ounces was removed in this manner.

Balls or bayonets passing along or through the muscles covering the chest and its vicinity, demand a peculiarity of attention solely from the danger of inflammation spreading to the pleura, or the lungs and heart, or of troublesome abscesses forming. In this view the very slightest are interesting, and sometimes highly dangerous, particularly in persons disposed to pulmonic affections. When a ball has fractured one or more ribs, we must not be contented by enforcing a strict diet, but we must call in the lancet to our aid, and keep the bowels freely open with mild purgatives, and the skin in a perspirable state by antimonials, and diluents, aiding our endeavours with a supporting bandage, and picking away any spicula of bone which are within our reach. Balls sometimes lodge between two ribs, but this is not a very common case, and by a proper use of the forceps, occasionally employing one of its blades as a lever, they can be easily removed. In every injury of the chest, a firm elastic bandage is an indispensable assistant in the cure; the motions of the ribs are not only restrained, but the parts are powerfully supported by its application; if fracture has taken place in any of the bones, we have no other means so perfect of retaining them in their place; if a slight degree of emphysema has occurred before we see the patient, we thus prevent its farther diffusion; and if we are called on before it takes

* See Percy "Manuel," p. 125, and the authorities quoted by him

† *Bibliotheca Chirurgica*, folio, Geneva, 1721.

place, we may prevent the occurrence altogether. The extent and tightness of this bandage should be such as to oblige the patient to perform respiration, as much as possible, by the aid of the diaphragm and of the abdominal muscles; if there is a wound, an opening ought to be left so as to permit of the usual dressings without removing the bandage. These, however, are our most favourable cases.

Next in order, though not in frequency, are wounds opening the cavity, but not injuring its contents, which is comparatively a rare occurrence;* for a ball or bayonet that has passed through or between the resisting intercostal muscles or ribs, is rarely prevented from penetrating farther, particularly if it strikes in the intervals of the bone, and is driven directly forward. To discover whether the wound has injured the lungs or not, is a point which has given to the older surgeons great room for the employment of their ingenuity in devising possible cases, and has occasioned no small waste of time and wax tapers in ascertaining the exit of air through the passage. A practical surgeon will require but little investigation; bloody expectoration *immediately* on receiving the wound, and the terrible symptoms of dyspnoea, sense of stricture and suffocation, insupportable anxiety, and faintness, which succeed, soon enough discover the fact; and if by good fortune no intimation is given in this way, happy is the surgeon, and thrice fortunate the patient.

The immediate danger in wounds of the lungs is either from debility from hemorrhage, or suffocation from the blood flowing into the air cells and cavity of the thorax. The effusion of air forming emphysema is alsoa troublesome, but taking it abstractedly, is not a dangerous symptom of these injuries; neither is it by any means so frequent as has been supposed. The symptoms that I have now enumerated, whether single or in combination, may be deemed the primary effects of wounds of the thorax; violent inflammatory affections of the lungs and the membranes, ever subject to relapse; long and tedious suppurations, and exfoliations of the bones, are the secondary, and though not so rapidly fatal, are often as certainly so as the others. Diseases which, although we cannot strictly call them pulmonary consumptions, agree with them in many points, particularly in cough, emaciation, debility, and hectic, are often the consequences.

In whatever part of the thorax a ball, bayonet, or sabre strikes, our first object is to diminish the quantity of circulating blood,

* Among the extraordinary instances of recovery, there is a recent case where the shaft of a gig passed between the sternum and lungs. See "An Account of a Case of Recovery after an extraordinary accident," by William Maid- en, 4to, London, 1812. Venesection to 12lb. in ten days, saved the patient.

so vast a proportion of which passes through the contents of the cavity. On this the very existence of our patient depends; and we cannot from reasoning *a priori* fix any bounds to the quantity to be taken, or determine the intervals at which it is to flow; our practice in both respects must be governed by the effects. There lies a man with a wound in his chest; the blood is oozing from the external orifice in a constant, though slow florid track; in his frequent and painful efforts to cough, it is thrown up in frothy arterial mouthfuls, mixed with occasional clots; his breathing is oppressed almost to suffocation; his pulse quick, weak, and fluttering; his eyes are starting from their sockets; his nostrils are distended in his efforts at relief by inspiration; and his extremities are cold, and often tossed about in fruitless anguish. This wretched being must assuredly die if surgical aid is not promptly afforded him. The mode which should instantly be adopted in such a case is as follows: Without searching after balls or fragments of bone, or attempting to ascertain the precise track of the bayonet or the pike, or expatiating (as I have seen done by some young gentlemen fresh from their studies) upon the particular vessels or their branches which may be injured; let the man lay quietly along, and lose from thirty to forty ounces of blood from his arm, by a large orifice. This done, we should remove the cloths or handkerchief which may have been hurriedly put over the wound to staunch the blood. If he has fainted during the bleeding, or if we find him in that state when we arrive, instead of administering any cordials to him, we should put our finger into the wound, and extract every thing within reach, whether cloth, ball, iron, wood, splinters of bone, or clots of blood. If the orifice is not sufficiently large, we must not be afraid of making it moderately larger, by a cautious use of the probe, pointed bistoury, or the sharp one with a small morsel of wax on the end of it; by this means we make way for the removal of extraneous bodies, and may possibly discover the bleeding orifice of one of the intercostal arteries, which sometimes are cut, but *not at all so often* as speculative writers would lead us to believe. We now proceed to dress the wound itself. If it is gunshot, a light mild dressing will be sufficient; but if incised, the lips should be closed at once; and this treatment will be found to afford the most certain preventive to emphysema, future hemorrhage, or collections of matter. I scarcely recollect an instance where it was necessary to remove the adhesive straps, or (where it was gunshot) the usual dressings. We now lay the man down, and let him remain as quiet as possible and in as cool and airy a spot of the barn, church or hospital, as we can find. He will often require no farther aid; but if the case is very severe, he will possibly lie for some hours in a

state of comparative ease, till the vessels again pour forth their contents, and induce fresh spitting of bloody froth and a repetition of all the symptoms of approaching suffocation. The lancet must again be had recourse to; and if by this management, repeated as often as circumstances demand, the patient survives the first twelve hours, hopes may begin to be entertained of his recovering the immediate effects of hemorrhage. In the after treatment of a wound of the nature here described, we shall be considerably assisted by the aid of medicine: but until the danger of immediate death from hemorrhage is over, we must not think of employing any thing except depletion by the lancet; it, and it only, can save the life of the wounded man.

This immediate closure of the wound has been recently adopted by M. Larrey with success. The practice is not novel. John de Vigo, in the tenth chapter of his third book, has given an account of it; and Paré says that the practice is founded on reason and truth, if there is little or no blood poured forth into the cavity of the chest; he, however, does not close the wound for the first two or three days, to prevent accumulation of blood. La Motte closed all wounds of the chest most accurately with a tent; hence, perhaps it is, that in the whole course of his work he scarcely mentions emphysema. His history of the secret dressing, which consisted in sucking out the blood, and then closing the wound, is highly worthy of notice, and is given with great fidelity in his "*Traite Complet de Chirurgie*," vol. iii. p 20, Paris edition of 1732. But Belloste seems to have done more practical good in this way than any other French surgeon. He argues strenuously and successfully against keeping the injuries of the chest open, in his "*Chyrurgien d'Hopital*," and he sets a very valuable example to writers of a more modern date; for, in a letter in explanation of Sancassani's Italian translation of his work, he acknowledges his obligations to honest old Magatous, who wrote nearly one hundred years before him.

When the paroxysms of pain, the sense of suffocation, and the return of hemorrhage, have become more moderate, and occur at longer intervals, we may have recourse to means of less immediate influence, and spare the lancet. In this view, the most powerful medicine that we can administer is Digitalis, in such form as may best agree with the patient; and if the pain and efforts to cough are severe and spasmodic, we must have recourse to the aid of opiates. To this course of medicine should be added a rigour of diet, amounting to the total prohibition of every thing solid, and admitting of fluids only of the mildest nature and least irritating quality; and even these in small quantities and duly acidulated. Should we be fortunate enough to preserve our patient during the first six or seven

days, a relaxation in this rigour may be cautiously admitted; but a departure from the general plan, or an omission of bleeding on the rising of the symptoms, can only tend to accelerate the event that our efforts are designed to counteract. Mild saline purges, and an emollient enema, should be occasionally administered if required, and the patient kept in a state of the utmost quiet and seclusion from all external impressions, and in a cool atmosphere. Blisters are recommended by Cooper, article Wounds, Rees' Cyclopaedia, when much cough and pain in the breast continue, after bleeding has been fully practised.

In incised or punctured wounds, hemorrhage takes place instantaneously and profusely; in gunshot wounds, if the intercostal artery or lungs are only brushed, or some of the more minute vessels opened, it is not so violent; and we have rather to prepare for what may occur on the separation of the eschars, than to combat any existing symptoms, the general tendency to pneumonic inflammation excepted. In the event of secondary bleeding from the lungs themselves, we are in possession of no external means for remedying it; but whenever the tenaculum *can* be used to an injured intercostal artery, it should at once be applied, and the vessel secured by ligature.* Unfortunately, however, we but too often are disappointed in finding the source of hemorrhage; and here judicious pressure is our only resource. In some very slight injuries I have used the graduated compress with success; but if the sloughing is extensive, nothing but the finger of an assistant, relieved as often as occasion may require, and pressing direct upon a compress along the course of the vessel, or so disposed as to operate upon its bleeding orifice, will be of any avail. In the advanced stages of this and all other hemorrhages, when the most imminent danger is impending, the face becomes pallid and cadaverous, and bedewed with a cold clammy sweat, spreading down the neck and chest, and giving the parts a soiled greasy appearance; the lips are pale and quivering; the eyes glazed and inanimate; and the lachrymal caruncles remarkably sunk; as the danger increases, spasmodic twitches pass across the face and the angles of the mouth; the larynx is convulsively elevated and depressed; efforts of vomiting come on, and general

* I have never met a case requiring the tenaculum, although such have been reported by others. See Bell's Discourses on Wounds, pp. 263, 264, 3d edition. Plenck carried a needle round the rib of an injured intercostal artery, and putting a tent under it, tightened the ligature so as to compress the vessel. The-den, the Prussian surgeon-general, tried the plan, but fatal consequences ensued; he, therefore, in future, trusted to pressure on the vertebral portion of the vessel, first having cut it across, and then pressing it backwards with a tent of agaric. The hemorrhage from these vessels is, in some irritable habits, and where their bony covering is removed, much more profuse than could be supposed from their size; a general officer nearly lost his life in Spain from an accident of this kind.♦

convulsion, or a sudden relaxation of the sphincters of the anus and bladder, announce the approach of immediate dissolution.

When I first entered on the practice of military surgery, the fear of emphysema actually haunted my hours of repose. This fear I have often since witnessed in young men fresh from their studies, and in their search after, and treatment of this accident, they have been bewildered and embarrassed beyond measure; the plain fact is, that it does not occur perhaps in one case of fifty, and that in a great proportion of those where it does take place, under judicious treatment it is trifling. Sometimes, however, it is indeed tremendous in appearance, and most distressing in reality.

In confined punctured wounds this crackling tumour is of more frequent occurrence than in the free and open, and spreads with great rapidity throughout all parts of the cellular texture, the palms of the hands and soles of the feet excepted. I have seen a case from a bayonet thrust in the breast, where all distinction of chin, neck, and chest, were confounded in one general and unbroken surface; and it has been found that the air has entered the more condensed cellular substance, forming the envelopes of the different organs, and even into the substance of the viscera themselves—one proper application of the scalpel would have prevented it all.

The treatment of general diffusion of air has been supposed to have remained in obscurity until the time of Dr. William Hunter, who has given a description of emphysema, like every thing else he has touched upon, of great elegance and correctness; and who has performed and recommended the only and very natural remedy of letting the air escape by incision.* But to go no farther back, the father of British military surgery says,† “A footman was wounded in the left side; he coughed blood, and discharged much by the wound. Some few days after, a tumour arising about the wound, I gave him a visit, and felt the swelled part crackle under my fingers. Concluding it wind got out from the cavity within the thorax, I made an incision into the swelling about an inch long, by which the wind was discharged.”

In the case of effusion of air into one side of the thorax, or into one sac of the pleura, the quantity must depend upon the greater or less adhesion of the wounded lungs to the costal surface,—a circumstance which is so frequent as to be scarcely looked upon as morbid; in whatever proportion the effusion may be, the wounded lung is incapable of perfectly performing its functions; did it dilate and contract by the inhalation and expi-

* Medical Observations and Inquiries, vol. ii.

† Wiseman's Eight Chirurgical Treatises, fol. ed. London, 1705, p. 349. Observat. 4th.

ration of air, it never could heal at all. Fortunately it lies for the most part sunk, and always quiescent; and when the wound, in its parenchymatous substance, coalesces, it gradually extends so as to fill, as it originally did, the side of the thorax to which it belongs. Whenever the orifice in the teguments is open, the air has a free passage through it, and continues to be forced out at every attempt at expiration, until the process of adhesion has taken place, if not prevented by art. If the lung lies collapsed at the bottom of the thoracic cavity, and that the external wound is healed up before it has resumed its natural inflated state, any small portion of air that may remain within is soon decomposed or absorbed. In many cases, however, where, adhesion exists, or has subsequently taken place between the wounded lung and the thoracic pleura, air in small quantities continues to be discharged through the external orifice, (whenever the dressings are removed,) until it is perfectly healed, without any serious inconvenience to the patient.

The sinking of the lung is not a uniform consequence of a penetrating wound of the thorax. We have sometimes ocular proof of this, not only by the close contact in which the lungs lie to the wound, discoverable at first sight, but by protrusions which occasionally happen, and which, in the hands of the older surgeons, were removed by the knife,—a practice now rejected, and gentle pressure substituted. These facts are still farther illustrated and confirmed by the observations of Mr. Abernethy on the subject,* and the experiments of Messrs. Hewson and Littré in the respective Memoirs of the Academy of Surgery at Paris, and of the Medical Society of London. When this sunk state of the lung occurs, it obviously reduces a man to half his usual allowance of air; it is, therefore, (though not necessarily fatal,) a very hardy act of a surgeon, who deliberately runs the risk of depriving him of the other, by puncturing the sound side of the thorax. That the opening both sides of the thorax at once has been fatal in man, experience has proved, and this when the opening was made, both by accident and with a curative intention; it must be confessed, however, that, with all the experiments and facts before us, there is still an ambiguity in the “philosophy of emphysema,” to use a term of Mr. John Bell’s hitherto unravelled, notwithstanding his illustrations of the point. From experiments on brutes we derive no satisfactory elucidation, for in some, where incisions on each side have been made through the intercostal muscles, much greater than the natural passage of the air, the lungs, so far from collapsing, have puffed out, the animal has lived, and in ten days ran about as well as

* Works, vol. ii. on Emphysema. In Richerand’s late celebrated case of Excision of a portion of the Ribs, the lung was forced towards the opening.

ever; and in our own species, the recoveries from sword and gunshot wounds of the thorax on both sides, larger than the orifice of the glottis, dangerous as they are, are not a few.*

The distressing state of the respiration consequent on general emphysema has led to a great anxiety on the part of surgeons to remove it, and, where it has not been allowed to proceed too far, incision or punctures, cautiously employed, will effectually produce the evacuation of the air, and afford great relief to the patient. The accident, however, can seldom proceed to any great length with the proper use of the preventing bandage, and the closing of the wound at once, as already recommended, together with a free incision of the puffy tumour on its first appearance, as practised by Wiseman.

A still greater anxiety has existed on the subject of the air contained within the sac of the pleura, and numberless means have been proposed and adopted for its removal; it was long customary to take advantage of the interval between the termination of the expiration, and the commencement of the effort to inspire, and then to form a valve of the teguments, as recommended by the writers of systems of surgery; but I have met with so many instances in which the patient did well, by closing the wound at once, and without ceremony, by a bit of adhesive plaster and the preventing bandage, that I have long left all attempts at extracting air entirely aside. Sometimes, indeed, it occurs that an officer has some confused notions of respiration and of the supposed state of the lungs from wounds; and having unfortunately heard of their being compared to a pair of bellows, insists upon the necessity of great nicety and caution in preventing the accumulation, and in effecting the expulsion, of air, by the application of air-pumps, &c. &c. I know one instance where death had very nearly ensued from gratifying the wishes of a *philosophic General* in a whim of this kind; but if cautiously done, and that it amuses the patient or his friends, I would by no means rigorously forbid it. Mr. Abernethy shows that the air-pump may be employed without harm, if not with advantage; but the blowing wind instruments, by way of puffing out the lungs and forcing the air before them, is worse than useless; the attempts are highly hurtful. Fortunately they are now scarcely recollected, and the army surgeons of the present day are quite convinced, that when their patients are capable of performing such feats, they may discontinue their attendance.

* See Ravaton and Van Swieten's Commentaries on Wounds of the Thorax. Forestus, Schmucker, Hemman, and Schlichting, all concur in testifying the fact. Consult also "Hoadly's Lectures on Respiration, read before the College of Physicians of London as a Gulstonian Lecture, Anno 1737, London, 4to. 1740; where some curious plans and diagrams are given illustrative of the effects of opening both sides of the thorax.

Emphysema, on some occasions, is of a secondary nature, and very obscure in its history and progress. A case, curious, difficult, and important in all its details, occurred in the military hospital in Edinburgh castle some short time since, with which Dr. Thomson has furnished me, and which I shall briefly state.

CASE LX.

Secondary Emphysema.

George Gunn, 93d regiment, was wounded at the attack of New Orleans, on January 8, 1815, by a rifle bullet while in the act of firing his musket. The bullet entered on the left side a little above and behind the articulation of the clavicle with the scapula, and, anterior to the edge of the trapezius muscle passed apparently across the back, and was cut out about 48 hours afterwards from below and behind the acromion process of the right side, having attached to it a splinter of bone about an inch in length. About ten minutes after receiving the wound, blood flowed copiously from the mouth on turning from side to side, and was occasionally brought up by hawking or coughing slightly. Hæmoptysis and acute pain of the left side of the chest supervened, which continued about three weeks, and for which he was twice copiously bled. Immediately, or soon after the wound was received, air was discharged from the orifice, and continued to be so while it remained open, with so much force as to drive off the dressings. In about two months the constitutional symptoms which supervened had abated, and he gained flesh and strength; and although, while the orifice of the wound continued open, and allowed the air to escape, his respiration was comparatively easy, yet, on exerting himself, he was always affected with oppression and difficulty in breathing. During this time he continued under the care of the American surgeons, but afterwards returned to England, and was received into Chatham hospital in the beginning of June. The external wounds, which had discharged, while open, several small spicula of bone, had healed up a short time before his arrival. Some time after, on using the dumb bells for the removal of a stiffness in the shoulder, air was forced from the chest among the soft parts on the left side of the neck, and the posterior part of the shoulder, and was easily recognised by the emphysematous crepitus. This spread considerably, became painful on pressure, and his breathing was difficult, and attended with great pain in the left side of his chest. He was bled copiously and repeatedly during the period of this affection, which occurred in November, and an incision was made into the swelling, a little behind the entrance

of the ball, by which a large quantity of air and purulent matter were discharged, and the patient was almost instantaneously relieved. The incision continued to discharge air and pus for about two months, when it healed, and his health being much improved he was discharged. At the expiration of a month, air again began to be forced among the soft parts, with the same crepitus as before, and a recurrence of dyspnœa and pain. He was taken into the Edinburgh infirmary for these complaints, and, being relieved, went to the Highlands; but his complaint again returning, he was, in the beginning of July, admitted into the depot hospital.

Thus far the account is derived from himself, and from inquiries among the medical gentlemen who attended him. The following is the sum of the reports made upon him in the depot hospital:—When he coughs or shuts the glottis,* and makes an effort to expire, a sudden croaking noise is produced, which can be heard at a considerable distance, and, on placing the hand at the root of the neck at these times, the soft parts are felt to be suddenly distended, and to communicate a feeling of crepitation which continues at all times to a greater or less degree in the neighbourhood of the wound. This noise and the accompanying escape of air can be prevented by pressure with the point of the finger in the course of the first rib, a little above and nearer to the spine than the cicatrix of the original wound. He has laboured under dyspnœa, with severe cough and expectoration of mucus, streaked with blood. The dyspnœa is much aggravated by the slightest exertion, and he frequently complains of pain in the left side, as if produced by a cord drawn tight from the shoulder to the lowermost rib of that side. The position in which he lies easiest is on his back, with his head and shoulders a little raised. The left side of the chest appears enlarged, and emits, on being struck, a sound distinctly more hollow than the right. His pectoral symptoms are always aggravated in damp foggy weather. His flesh, since his admission, has wasted, his strength has decayed, and he has been in a state approaching to hectic fever. Opiates have been administered, and occasional blisters applied, with temporary relief. An incision into the swelling has also been made at the root of the neck, but only a small quantity of air was discharged, and little relief obtained.

Under all these unfavourable circumstances, Gunn sunk apace, and died hectic. The following were the appearances on dissection:—On opening the chest, that cavity appeared to be considerably diminished, and the lungs on both sides were found ad-

* It is from this power of shutting the glottis, as explained by Dr. T. in his lectures on this and similar cases, that emphysema is so often spread with such force and rapidity; the patient, catching his breath, forces the air still farther into the cellular substance.

hering very firmly to the pleura costalis. The consistence of those organs was firmer than usual; and when cut into, their air cells appeared to be almost obliterated. The ramifications of the bronchiaæ appeared to be filled with puriform mucus. At the upper and posterior part of the left side of the thorax, a cavity was found existing between the surfaces of the pleura pulmonalis and costalis, capable of containing from 10 to 12 cubic inches of air. The inner surface of this cavity was lined with a thick firm membrane of coagulable lymph, particularly strong in the place where the lungs adhered to the parietes of the chest; it contained only a small quantity of pus, which seemed to have been secreted chiefly from the ulcerated surface of the lungs, forming the parietes of this cavity. Two small openings were observable at the upper part of the cavity, penetrating through the pleura costalis, between the second and third ribs, and communicating with an abscess which existed in the upper and back part of the shoulder. It was obvious that the second rib, a small portion of which was found bare, had been fractured by the bullet which inflicted the wound, and that a considerable quantity of callus had been thrown out on the re-union of the fracture. The abscess over the shoulder was immediately under the skin and cellular membrane, and extended several inches backwards and downwards from the external wound. No distinct marks could be seen of the course of the ball.

After the extraction of extraneous matters, and the cessation of hemorrhage, it is still a question, among some surgeons, whether wounds of the thorax should be dressed simply and lightly, or kept artificially open by the introduction of lint in the form of tents, &c. and of metallic canulas for allowing the exit of putrid blood, matter, and air. From my own experience, I have no hesitation in giving the preference to mild easy dressings, where it becomes necessary, from the formation of extensive collections of purulent matter, or bloody sanies, to keep the wound at all open. If the patient is placed in a proper position, that is, with the wound in a dependant posture, (and, in general, he lies by choice on the affected side,) the exit of effused fluids is not necessarily impeded; if they exist in large quantity, the wound is effectually prevented from closing, by the state of general irritation in which the system is kept by their effusion, and by their pressure on the lungs; if the flow is so minute as to admit of the union of the wound, the quantity effused is within the power of the absorbents to remove, and will produce no constitutional effects. I have seen, among foreign surgeons, tents and canulas so long continued as to give rise to the very symptoms they were meant to remove, and to become absolutely necessary to the patient's constitution; while, in our own hospitals, where they are very little employed, I have never

seen the closing of the wounds followed by ill effects. The case, however, becomes very different, when, from unabsobered blood, or a wide spread pulmonic or pleuritic inflammation, a true empyema, or fluid collection, is secondarily formed; or when, after all the dangers of the first stage are happily subdued, irregular chills, succeeded by great oppression of breathing, difficulty of lying on the opposite side, restlessness, œdema, and distortion of the chest, take place, and the propriety and strong necessity of performing the paracentesis is obvious. But even here, keeping the wound open for any length of time by a canula, is a practice so little followed by the generality of British surgeons, that I am inclined to hesitate upon its necessity. I have contented myself with the application of a little lint, not so closely pressed in as to confine the discharge forcibly, and gradually diminished as the discharge has lessened.

If the symptoms of effusion of purulent matter succeed the original wound within a short period, the site of the injury, as chosen by some surgeons, is the most proper point of puncture. If the empyema is formed at a more distant period, the spot of election, as it is called, or between the 6th and 7th true ribs, is preferred. I should recommend a point considerably below the original wound, as adhesions, either general or partial, are apt to form in its neighbourhood. I have observed great relief to follow this operation; but I have also seen a removal of all the pulmonic symptoms take place, and death very frequently ensue shortly after the puncture. In the examination of some of the bodies, I have met with abscesses in the very substance of the lungs, completely out of the reach of any operation, and not indicated by any peculiarity of symptoms during life.

Nature sometimes makes an effort for the removal of the fluids effused in cases of empyema, by distant channels, but the instances are rare, and not often successful. M. Richard De Hautesierck, in the Collection of Cases from the French military hospitals, edited by him, (vol. i. p. 343,) gives a highly interesting instance where the evacuation of a large quantity of purulent matter, by expectoration, by stool, and by urine, relieved an extensive empyema, which had succeeded a wound of the breast. A case somewhat analogous occurred at Brussels, where a French prisoner was wounded by a musket ball, which entered the thorax between the 8th and 9th ribs, at the distance of two inches from the vertebrae, and lodged internally, but in what situation was never afterwards known, although some pains were taken to discover its course, which was conjectured to have been through the diaphragm, for the dissection showed a hernia of the stomach, through that septum into the thoracic cavity. This man lived from the 18th of June, the day of his wound, until the 1st of November, when he died hectic.

He had a discharge of about a pint of purulent matter daily from the external wound, but it suddenly ceased, and the stools became very frequent, with a large commixture of pus, some time before his death. The thoracic cavity exhibited only a slight ulceration on the surface of the lungs, at the entrance of the ball, and a small sac, containing a very little matter, similar to what was mixed with his stools during life.

I have never had an opportunity of examining the lungs after recovery from a *severe* wound. Where death has occurred after *recent slight* wounds, thickenings, adhesions, and the other usual consequences of inflammation are observed; but Sir Everard Home has given us the appearances on dissection, after a lapse of 32 years, in a paper in the 2d vol. of the "Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge," p. 169, which is highly interesting. An induration of the substance of the lungs was formed wherever the ball had passed, its entrance was readily discovered by a cicatrix, the membrane at that part being thinner than usual, and having a puckered appearance, which terminated in a central point. This part of the lungs had not the slightest adhesion to the pleura, but was in its natural detached state. The portion of lungs above the course of the ball contained serum, and not air: it sunk in water, but was not contracted in size: it had no communication with the bronchia, the adhesive inflammation having consolidated all the parts above the line through which it passed.

I should be unwilling to lull either a patient or a surgeon into a false security, or to underrate the real dangers of any case; but I have seen so many wounds of the thorax, both from pike and sabre thrusts, and from gunshot, do well, ultimately, that I cannot but hold out great hopes where the third day has been safely got over; for, though occasional hæmoptysis may come on, at almost any period during a cure, and its approach can neither be entirely prevented nor anticipated, the more deadly hemorrhages are usually within the first 48 hours; and yet, to this alarming symptom, when within moderate bounds, the safety of the sufferer is often due.* I have met with many cases, where no surgeon being within reach, the spontaneous and unchecked hemorrhage has saved the patient's life; no attempt at surgical treatment, except a very clumsy one, of applying rags or handkerchiefs to the wound, by the patient or his brother soldiers, having ever been made; the bleeding has ceased spontaneously, the wound has closed, and any extravasation of either

* Dr. Gregory of Edinburgh, was in the habit of stating in his Lectures, that of twenty-six wounds of the thorax received at the battle near Quebec, two only were fatal.

blood or air within the thorax has been absorbed. I could produce a great mass of evidence upon this subject; but I shall confine myself to one case, which will sufficiently illustrate the point.

CASE LXI.

Penetrating Sabre Thrusts.

“ George Harman, aged 33, now hospital sergeant of the 10th hussars, received a wound through the lungs from the thrust of a sword, in an affair with some French cavalry near Morales, in Spain, on the 2d of June, 1813. The sword entered the thorax behind, close to the basis of the right scapula, about the middle of its margin, and the point came out on the edge of the sternum, betwixt the articulations of the 3d and 4th ribs of the same side. He immediately fell from his horse, and soon fainted from loss of blood. In a short time he recovered, and had power to raise himself, and to sit upon the side of the road where he fell. In his removal to the village of Morales, about one hour and a half afterwards, he again fainted from returning hemorrhage. When he had remained quiet a short time the hemorrhage nearly ceased.

“ I examined the wounds, (says Assistant-surgeon Rogers, who has favoured me with the case,) and found that situated near the scapula rather more than an inch in extent; that in front was scarcely half an inch. On inspiration, the blood was thrown out from the posterior wound to the distance of several inches, in drops, so as to sprinkle my face when examining it; it was also forced out of the anterior wound in a frothy state. Blood was thrown up by coughing; the pulse was barely perceptible; a cold sweat had broken out: he was extremely faint, felt great anxiety, and complained of much pain in the chest; no appearance of emphysema at either wound. The edges of the wounds were united with adhesive plaster, and covered with a compress of lint, and a bandage applied. This was about three o’clock. At six in the evening the pulse had risen a little, the pain in the chest had increased, but no farther hemorrhage had occurred. At nine o’clock, there had been a return of hemorrhage, not very great, and it had now stopped; the pulse continued much the same. At six in the morning of the 3d, I found he had passed a very restless night, but without any return of hemorrhage: his pulse was quick and small; pain in the chest remained the same; respiration more difficult. At nine o’clock no change of symptoms; the bandage and dressings had become loosened; no emphysema round the larger wound; the edges of

the smaller one were rather puffed; but the little tumefaction which appeared proceeded chiefly from blood extravasated. The wounds were again dressed, and I left him in charge of Mr. Pulsford, assistant-surgeon of the 18th hussars, to be removed to the general hospital at Toro. He now (January, 1817) feels no inconvenience on moderate exercise; but running or any violent exertion, causes quick and painful respiration. I have one other remark to make on his present state. If the finger be applied to the site of the posterior wound, a singular vibration is very perceptible when he speaks, confined immediately to the spot. If it be argued that the sword did not penetrate through the chest, but that the wounds were by separate thrusts, I can speak positively to the contrary. This being the first time we met the French cavalry, curiosity led me forward with the squadron which charged. I was close in the rear, and saw this man wounded *after the enemy were broken*, being scarcely twenty yards from him at the time." So far Mr. Rogers; and I am myself enabled to add the following fact:— When I took charge of the hospital at Toro, on the 9th of the month, seven days after the action, I found Harman, who was an active acute man, giving every possible assistance to the other wounded, both English and French, and performing the duties of a hospital sergeant; no other dressing had been applied to the wound but a slip of adhesive plaster; and no morbid appearance whatever had taken place. He had suffered a convulsive fit of vomiting on two occasions after the wound was healed, without any apparent cause, in which he had ejected a large quantity of bile. He had another of these attacks some months after, when the diaphragm was severely affected with spasm; but his general health when I saw him a few months ago was excellent.

Injuries of a most serious nature are inflicted by wounds in the upper and back part of the thorax without entering its cavity; but which produce dreadful laceration of the muscles, splintered fractures of the clavicles and scapulæ, and profuse hemorrhage from the arteries running along these bones. The sternum is often injured by gunshot, and fractures accompanied with severe cough and enormous collections of matter are the consequence. The patients often die hectic; but in good constitutions, where the purulent matter is duly evacuated, and all extraneous substances removed from the wound, life is frequently preserved to a lengthened period. In some of these cases, very large splinters of the sternum have been successfully removed.

The injuries of the scapula itself are not of a very serious nature. Balls make a clean passage through its broad plate, and the splinters occasioned by them are easily removed; nor

are the simple fractures of the clavicle of great consequence *abstractedly*; but I have seen some of the most tremendous wounds in which they have been implicated, and the inflammation and sloughing disposition spreading from them to the thoracic viscera and to the shoulder-joint, have been productive of protracted tortures to the sufferer, rendering life a very dubious blessing indeed.* The immediate preservation of existence has, in the fortunate cases, certainly depended on the profuse loss of blood; and the antiphlogistic regimen, with the utmost simplicity of dressing, has perfected the recovery.

The following appears to me an instructive and interesting case:—

CASE LXII.

Severe Wound of the Lungs.

Lieutenant-colonel H. received a grape-shot of eight ounces' weight on the day of Waterloo, just as the action was decided. The ball entered precisely under the centre of the clavicle of the left side; raised the periosteum into a few small floeculi, and passed through the spine of the scapula close to its neck, lodging between the skin and his flannel waistcoat. Profuse hemorrhage, incalculable as to quantity, but designated by his servant and the surrounding soldiers, who had seen many hard fought days, as "*enormous beyond example*," instantly took place. He lay for dead for some time. On his recovery he found himself in the hands of a foreign surgeon at a village adjacent to the field, faint, but collected; his arm numbed and immovable, but very sensible to pain when touched. I need scarcely say that he had been in extreme danger, when the assistant-surgeon of his regiment joined him, shortly after his wound. When he was placed under my superintendence, on the ninth day, suppuration was fully established, and on removing the dressings, some few splinters appeared around both the sternal and dorsal aspects of the wound. I was very curious to see the state of the artery; it lay awfully pulsating *in situ*, (which uncovered arteries are not always observed to do,) bare for about two inches in length, or I should rather say *unconnected*, for its surface was studded with healthy granulations of unequal size, from a pin's head to that of a pea; the plexus of

* A very remarkable case is noticed in the Edin. Med. Jour. vol. xi. p. 140, communicated by Dr. Halliday, surgeon to the forces, where a 24 pound shot fractured the bone extensively, exposing the lungs and pericardium, yet the patient recovered.

nerves was bedded in granulations; the arm was stiff, and all voluntary influence over it gone; and the slightest motion in dressing the parts was attended with exquisite torture. The posterior wound was somewhat puffy, and a triangular piece of the scapula, easily removeable by the fingers, lay in it. No accident or interruption to the cure occurred till the 14th day, when a most acute pain in the region of the kidneys, and frequent ineffectual calls to make water, attacked him during the night.* By warm fomentations, and the use of mucilaginous drinks, this accidental symptom was removed. His cure then went on uninterrupted for some days; granulations of a healthy appearance spouted rapidly up in all directions; and the discharge, though copious, was of a very bland nature, and inoffensive in smell, until, in an unguarded moment, he was induced to allow of the removal of the supporting bandage in which his arm had hung since the receipt of the wound. Immediately after this the pain in the joint and all around became almost insupportable; the whole upper extremity, and particularly the fingers, became œdematosus, numb, and tormented with an occasional prickly sensation; and the discharge was very profuse and gleeting, with large drops of an oily nature floating on it, which, both from appearance and from the spot whence they flowed, there was every reason to suppose were synovial. By restoring the arm to its former situation, and applying emollient cataplasms, these symptoms were relieved; and in a few days, as this increased discharge had very much debilitated him, he was allowed a more nutritive diet, with some English porter. The healing process was soon re-established; and, by the use of adhesive straps, the edges of this great wound were brought together, and a partial use of the arm was admitted of, with every hope of its regaining its full powers. His general health was completely restored; and he returned to England in the third month from the accident.

In another case, which occurred in the same action, a nine-ounce grape-shot passed nearly in the same direction, and was cut out beneath the clavicle; the patient recovered. How the arteries and nerves escaped in these cases, I cannot pretend to explain.

There is a class of wounds in the neighbourhood of the scapula, which, though not of a threatening nature at first, yet often and unexpectedly have a fatal termination. These are principally occasioned by gunshot, but sometimes by punctured wounds, which directly open the infra-scapular vessels, or cause

* This affection of the kidney, which the older surgeons imagined was a process of nature, to carry off peccant matters, and for which they, therefore, prescribed diuretic vulnerary decoctions, was here, I believe, entirely accidental; they supposed there was a direct passage from the vena azygos to the kidney.

them subsequently to slough and pour forth their contents internally; giving to the eye the appearance of very trifling hemorrhage, but filling the whole sub-scapular space with blood, which makes its way down to the very loins by infiltration, and there causes deep abscesses and even gangrene. The long and distant range of parts through which the blood passes prevents the detection of the cause immediately; and, indeed, could we even discover it, I am not aware of any effectual mode of securing the bleeding vessels. In the cases I have met, the blood has been effused in large quantities, and has descended nearly to the sacrum, dissecting the interstices of the muscles completely, and giving to the posterior part of the thorax and the loins, that appearance said by Valentin to designate sanguineous effusions into the sac of the pleura.*

The supra-scapular vessels are sometimes the source of fatal hemorrhage when wounded. I have met with one curious case in a French dragoon, who was wounded at the action of Morales by a deep sabre thrust. He was reduced so low by repeated bleedings, that when Staff-surgeon Dease and myself saw him all hopes were at an end. The wound had been secured by the twisted suture and by compress, which had partially stopped the hemorrhage. On examination after death, the supra-scapular artery was found to be punctured, and an aneurismal tumour, as large as an egg, was formed at the site of the wound.

In many cases in military practice, when great injury has been occasioned by guns, tumbrils, &c., running over a man, the concussion alone is so great, that the functions of the diaphragm, heart, and lungs, are for a while impaired, and sometimes actual death takes place, without any very satisfactory explanation of the cause being afforded by dissection. When the patient has recovered from the immediate shock, inflammatory symptoms often arise to a very high pitch. I have occasionally met with herniary protrusions of the lungs from these causes, which have been attended with no particular inconvenience, but have suppurated freely and have been punctured like cases of common abscess. But, in general, all injuries of the thorax lay the foundation of a strong disposition to disease, particularly influenced by the state of the atmosphere, and approaching very close in its nature to pulmonary consumption. Of this the following are the heads of a case, and the particulars of the dissection, communicated by Mr. Read, assistant-surgeon of the 25th regiment.

* Valentin, "Recherches critiques sur la Chirurgia Moderne," Paris, 1772.

CASE LXIII.

Phthisical Tendency excited by Injury of the Thorax.

"J. G. of the 25th regiment of infantry, received a contusion on the lower part of the left side of the thorax, from the bursting of a shell, at Ciudad Rodrigo, which produced severe pain and occasional difficulty of respiration. These immediate consequences were removed by proper remedies; but in some time afterwards he was seized with a violent catarrh, in consequence of exposure to cold on a coasting voyage. Dyspnoea came on, followed in succession by cough, debility, emaciation, and copious expectoration, until, after the usual vacillation between degenerating, and improving health, death, in about twelve months, terminated his sufferings.

"On dissection, the whole of the right lung presented externally the natural appearance, and no adhesions were formed between the pleura pulmonalis and costalis, but two-thirds of its internal substance seemed to consist of small, hard tubercles. The left lung adhered throughout its whole extent to the pleura costalis and mediastinum, from both of which it was separated with difficulty; the lobes also adhered firmly to each other; the adhesions were very strong, and of a firm dense membranous texture; the whole lung was of a dark livid hue, and consisted almost entirely of tubercles, which varied in size from that of a grain of common sized shot to the size of a filbert. Three or four of the largest measured one inch in length, by three-fourths of an inch in breadth; and, when laid open by the scalpel, presented a dark cineritious appearance. They were of a firm, hard, consistence externally; but when pressed upon, or rubbed by the finger, communicated a friable earthy sensation. The whole of the tubercles were uniformly hard and dense, and no tendency to suppuration could be discovered in any of them. Incisions into the substance of the different lobes of both lungs were immediately followed by an oozing of mucus from the bronchiæ, but no collection of matter, or any mark of recent inflammation, could be discovered. The trachea, particularly the lower part of it, and the larger branches of the bronchia, were literally filled with a glairy tenacious mucus, the capsule of the heart contained about eight ounces of serum, of the natural colour and consistence; the heart was perfectly sound, but remarkably small, and the parietes of the left ventricle were three-fourths of an inch in thickness; the outer side of the left ventricle adhered firmly to the pericardium; the adhesion was of a circular form, and was about one inch and a quarter in

diameter; the aorta ascendens was preternaturally hard and dense, but no actual ossification had taken place.

A sense of stricture in the chest, and considerable pain on raising the body to an erect posture, with great anxiety on walking up an ascent, are very frequent consequences of wounds of the thorax after their cure; and, in two cases lately under my charge, great depression of spirits, and a very impaired state of the digestive organs, followed wounds in which the intercostal nervous branches were implicated.

It may be observed generally of the organs contained in the different cavities, that, after any serious wound, their disposition to disease is very much increased; and causes which, in a state of health, would have had scarcely any effect upon them, operate very powerfully. In the head the tendency to congestion becomes so great, that phrenitis and mania follow any excitement from heat, exertion, violent emotions, and especially excesses in drinking. In the abdomen, hernia, local pains darting around the affected part, irregularity of the bowels and the stomach, borborygmi, gastrodynbia, &c. &c., follow its injuries. The lungs suffer severely in the lesions of the thorax, the slightest atmospheric changes affecting them powerfully: this consequence is almost invariable; yet there have been remarked instances where a naturally delicate, or even an actually diseased state of the lungs, has been bettered by a penetrating wound. An instance of this kind has never come under my notice; although I have very respectable living authority to say, that a strong predisposition to phthisis was suspended in one case, and spasmodic asthma remarkably relieved in another, by penetrating wounds of the thorax. M. Larrey mentions the case of an officer cured of a well-characterized phthisis by a wound which penetrated this cavity. *Memoires*, tom. iii. p. 376.

I shall now refer to some curious particulars of wounds and injuries of the heart. Ambrose Paré has, in the 30th chapter of his fifteenth book, given all the information upon the subject known up to his own day, and proving that they are not instantly mortal. Lamotte has given cases in support of the same opinion. Bonetis, in his *Sepulchretum*, book iv. section 3d., treats on this subject; as does also the illustrious Morgagni, who adds some cases to those collected by Bonetis, in the 53d Epistle, article 27. Haller gives an instance of a needle found in the heart of an ox, in his valuable "*Bibliotheca Chirurgica*," vol. ii., p. 378; and, by the kindness of Mr. Hammick, surgeon of the royal naval hospital at Plymouth, I have lately seen a preparation of a pin lodged in the human heart, (but without any trace of the mode by which it got there,) of which some cases are to be found in the references of Ploucquet.—The patient had complained of pain in his chest, about three months previous to his

death, and died of a carditis. Immense thickening and enlargement of the organ, with extensive effusion of coagulable lymph upon its surface, and adhesion to the pericardium, was discovered on dissection. In the last-mentioned work are to be found references to cases of balls lodged in the heart of a stag; in the heart of a fresh healthy dog; and in the anterior ventricle of the human heart, where it is stated to have remained for years. In the 12th vol. of the Edinburgh Medical and Surgical Journal, p. 498, there is detailed an instance of a ball lodged in the heart of a deer. M. Fournier, the learned author of the article "Cas Rares," in the "Dictionnaire Des Sciences Medicales," gives a case where a soldier, who received a gunshot wound of the breast, was taken up for dead, a violent hemorrhage having destroyed all hopes of his surviving. By great care, the flow of blood began to diminish about the third day; his strength insensibly increased; suppuration came on, and many splinters of bone exfoliated. At the distance of three months the wound was cicatrized, and the patient's health re-established, with no other inconvenience than frequent palpitations of the heart, which continued to harass him for three years; they then became less troublesome for three years more, when he died with a disease unconnected with the affection of the heart. On dissection, the cicatrix was found to be very deep, with loss of substance of the fractured rib. On farther examination, the ball was found lodged in the right ventricle of the heart, near to its apex, enfolded in a great measure in the pericardium, and resting upon the septum medium.

A very curious preparation of the species of herniary protrusion of a pedicle springing from the heart is to be seen in the Anatomical Collection, founded by the present director-general of hospitals, lately at York hospital, but now at Chatham. The following account of it has been furnished me by Mr. Blackadder, who prepared it. It occurred in an English soldier, who was severely wounded in the chest with a bayonet at the battle of Waterloo. About three months after he was cured and discharged from hospital, he (along with several of his comrades) was attacked with pneumonia, and died under that disease. Upon examination after death, the following morbid appearances were detected: "On the left side of the thorax, two inches below the ensiform cartilage, and immediately under the cicatrix of the wound, there was a lump formed on the edge of the cartilage of the ribs, evidently showing that the weapon had forcibly injured that substance when the wound was inflicted. In the diaphragm, at that part where the pericardium adheres to it, and nearly in a line with the external wound, there was a perforation extending into the cavity of the pericardium, and of a size readily to admit the ring finger. Through this perforation there

protruded a fatty pedicle of tongue, or fully an inch in length, and about two-tenths of an inch in breadth; its anterior surface being convex and somewhat lobulated, while its posterior surface was smooth and flat. This pedicle did not adhere to the diaphragm; but, on opening the pericardium, it was found to arise from the anterior surface of the heart, about an inch and a-half from its apex. The heart was of a larger size than is usually met with; and its anterior surface, from a little way above the origin of the pedicle to the base, was attached to the pericardium by means of long, broad, and strong ligamentous bands, which were evidently the effect of an attack of acute inflammation at a period anterior to his last illness. His heart is still preserved, and was one of the first that I put up when employed, in 1816, in making the anatomical preparations at York hospital."

Dilatations of the heart are sometimes occasioned by blows upon the back or sternum, and the disposition to aneurismal affections of the great vessels are produced in a similar manner. I shall conclude this interesting subject, which I might easily enlarge on, by referring to Guattani, "De Aneurismatibus," for an instance where a patient survived a wound of the aorta for eight years; and to "The Medical Records and Researches," London, 1798, for a case of a penetrating wound, in which a bayonet passed through the colon, stomach, diaphragm, part of the lungs, and the right ventricle of the heart, and the patient survived the accident for upwards of nine hours; it is communicated by Dr. Babington from the records of his majesty's royal hospital of Haslar. Nor should a very interesting and learned paper, by a French army surgeon, be forgotten; the author, M. Chastenet, surgeon to the military hospital at Lisle, in Flanders, has collected various observations on the subject, but he gives five highly interesting cases, which occurred in his own hospital. One is particularly detailed from the papers of his father, in which a bayonet had penetrated into the right ventricle. Life seems to have been preserved by the occurrence of faintness, a state in which the wretched sufferer remained without nourishment for five days concealed under an old staircase. He died the 15th day after the wound, and the 10th after his reception into hospital, where there can be little doubt that his death was accelerated by mortification, which had taken place in his lower extremities, from cold and a languid circulation. On dissection, M. Chastenet found cicatrization completed in both the lungs, pericardium, and heart, and no sign of effusion in the surrounding parts. "Quel triomphe," he naturally exclaims, "pour la Medicine expectante!" This interesting paper is to be found in the *Journal de Medecine Militaire*, vol. ii. In the 14th volume of the *Edinburgh Medical and Surgical Jour-*

nal is given the history of a case, illustrated with a plate, where a transverse opening about an inch in length was discovered, penetrating the right ventricle, near the origin of the pulmonary artery. On removing the heart, the ball was found in the pericardium; on tracing its course, it became evident that it must have remained in the right auricle, as the tricuspid valve had a circular lacerated opening on it, near its attachment to the muscular structure of the ventricle. The left side of the thorax contained about two quarts of a serous fluid tinged with blood; the lung was shrunk and adhered to the spine; the pleura costalis exhibited strong marks of inflammation; the pericardium was thickened and distended, and contained half a pint of the same fluid as that found in the cavity of the pleura; the heart had suffered from inflammation, a thin coat of coagulable lymph adhered to it, and near its apex was seen a small coagulum of blood; the contents of the right side of the thorax were unaffected with inflammation. The patient, a soldier of the Queen's regiment of foot, was wounded in Spain, came to England in a transport, and died at Plymouth on the 14th day after he received his wound, under the care of Mr. Fuge.

It must be confessed, however, that all these cases are rather objects of curiosity, and extreme instances of what nature can bear, than cases likely often to occur.

Of lesions of the thoracic duct, I shall not insult my readers by treating; the uncomplicated injury is barely *possible*, but art can do nothing towards its cure.

Although every systematic writer has treated upon wounds of the thorax, the French surgeons have been particularly attentive to them from Paré downwards; and, in addition to that great man, Lamotte, Belloste, and Ravaton, as military writers, are well worth consulting, as also several papers in the "Journal de Medecine Militaire." Bordenave and Guerin have given some excellent observations in the Memoirs of the Academy; and Valentin in his "Recherches;" Guisard in his "Pratique de Chirurgie;" Petit in his "Traité des Maladies Chirurgicales," and Sabatier in his "Medecine Operatoire," are highly worthy of attentive study. Among the Germans, Hemman in his "Chirurgische Aufsatze," and Schlichting in his "Traumatologia Novantiqua," Amstelodami, 1748, give many instances of both sides of the thorax being opened without the accident proving fatal; Schmucker, the great Prussian army surgeon, has some interesting cases in his "Wahrnemungen;" but Pechlinus in his "Observationum Physico-Medicarum, libritres," published at Kiel in 1682, has given perhaps the most minute diary on record of a wound of the chest, in which the blood lost amounted to an enormous quantity. In this country, Mr. John Bell has given an animated and interesting account of these injuries, in

his Discourses on Wounds; and Dr. Halliday, surgeon to the forces, has collected and detailed nearly all the experiments and observations of preceding authors, with some cases of his own, in his work on "Emphysema."

CHAPTER XIX.

WOUNDS OF THE ABDOMEN, PELVIS, &c.

THESE injuries are extremely severe in their nature, and very dubious in their results; like other wounds, they divide themselves into those which affect the *containing*, and those which affect the *contained* parts. In their treatment, the violence of symptoms is to be combated more by general means than by any of the mechanical aids of surgery. The search for extraneous bodies, unless superficially situated, is altogether out of the question, except they can be felt by the probe, as in Rava-ton's case, (Chir. D'Armée, p. 241,) or in cases of lodgement in the bladder, where they may become the object of secondary operations. Enlargement or contraction of the original wound, as the case may require, for returning the protruded intestine, securing the intestine itself, and promoting the adhesion of the parts, are all that the surgeon has to do in the way of operation; and even in this the less he interferes the better. Nature makes wonderful exertions to relieve every injury inflicted upon her, and they are often surprisingly successful, if not injudiciously interfered with.

In a penetrating wound of the abdomen, whether by gunshot or by a cutting instrument, if no protrusion of intestine takes place, and this, it must be observed, in musket or pistol wounds rarely occurs, the lancet, with its powerful concomitants, abstinence and rest, particularly in the supine posture, are our chief dependence. Great pain and tension, which usually accompany these wounds, must be relieved by leeches to the abdomen,* if they can be procured, by the topical application of fomentations,

* Their application to the anus, so as to unload the haemorrhoidal vessels, is much practised on the continent, in Russia especially, and is often attended with remarkable relief.

and the warm bath; and if any internal medicine is given as a purgative, it must, for obvious reasons, be of the mildest nature. The removal of the ingesta, as a source of irritation, is best effected by frequently repeated oleaginous glysters; indeed, on the first infliction of a wound of the abdomen, the contents of the intestinal canal and stomach are generally evacuated spontaneously by vomiting, and soon followed by stools which are sometimes tinged with blood; their accumulation must be guarded against by a rigorous diet; for, to the general state of fulness of the vessels induced by food, is added its local and mechanical stimulus in the undigested form. By this treatment, penetrating wounds, in which several plicæ of the intestines have been necessarily implicated, have been happily cured. Authors abound with instances of this kind, and I have seen several; among others, I have been a witness to the recovery of a soldier who had been shot through the abdomen by a ramrod, which passed in anteriorly, and actually stuck in one of the transverse processes of the vertebræ, from which it was not disengaged without the application of some force, this occurrence took place before Badajoz in 1812; it is to be hoped that the gentleman under whose care the case fell, will favour the profession with an account of it. Some instances are on record, and among them a remarkable one by Garangeot, and another by Lamotte, where a sword had passed right across the cavity of the abdomen without injuring a single fold of the intestines, to which possibly this case may be analogous.

The following case, received from Dr. Pockels, is as desperate as can well be imagined:

CASE LXIV.

Wound from a Grape-shot passing through the Abdomen.

A soldier of the Brunswick corps was wounded on the 16th of June, 1815, by a grape-shot, which struck the right arm near the cubitus, the articulation of which was destroyed. An English surgeon amputated the arm some hours after. The patient remained that night at Genappes. Next morning he observed blood flowing through the bandages, and requested Dr. Spangenberg, physician-in-chief to the Hanoverian army, to examine the arm; this able physician found the humerus split as far as the joint, and informed the patient that it would be necessary to perform a second operation; with the consent of the man, Dr. Spangenberg extracted the head of the humerus. After being dressed, the patient complained of pain in the lower bel-

ly; on examination, the grape-shot was found to have passed through the anterior part of the abdomen; and at the points where it had entered, and made its escape, a portion of intestine protruded, not wounded or inflamed, but in the natural state. The intestine was smeared with oil, carefully reduced, and the openings covered with adhesive plaster. The patient was brought to the hospital of Laecken on the 19th of June, with moderate fever, and very little pain in the abdomen, or in the wound of the arm. The functions of the intestinal canal were not disturbed. He took no medicine, but merely light broths. Five days after the operation, the wound of the arm presented a favourable aspect, and in four weeks was cicatrized. The wounds of the abdomen were cured more slowly, they were attacked with a slight degree of hospital gangrene after the wound of the arm was closed, but they healed by degrees in the space of three months. At present the patient only complains of pain in the abdomen during a change of weather, or when he commits any irregularity of diet. He receives a higher pension than a soldier who has only lost an arm, as he ought to be very attentive to his diet.

In some instances the ball, or a part of the weapon which has inflicted the wound, remains within the abdominal cavity, and is afterwards evacuated by the natural passages. The subject of the following case I saw while under cure, and I had afterwards an opportunity of examining him again, and taking the account from his own lips.

CASE LXV.

Musket ball passed by stool.

Peter Mathews, sergeant of the 28th infantry, received a wound from a musket ball in the abdomen, on the evening of the 18th of June, 1815, at Waterloo. It struck him upon the right side, about one inch below the navel, and three fingers' breadth to one side. Scarcely a tinge of blood followed the wound. He did not fall, but walked about 50 yards to the rear, from whence in half an hour, he was carried to a large barn in the village, where he remained for three days, before he was conveyed to a hospital at Brussels. During this period, he was bled three times ad deliquium; the first vein was opened about 24 hours after the receipt of the wound. On his arrival at Brussels, his principal complaint was incessant straining to stool, for which he received daily glysters. On the 6th day

from the receipt of the wound, immediately after an enema, he had an urgent call to the close stool, when he passed a small-sized rifle musket ball, enveloped in mucus, and unaltered in shape, except a small groove indented in it, probably from cutting along the bayonet or ramrod of the piece from which it was fired. The wound was perfectly healed by the 26th August following, without any ill accident or uncommon occurrence from the time of receiving it, except that, during the course of the first night, he was sensible of a sort of watery oozing, that moistened the linen placed on his wound, particularly whenever he drank, which he frequently did. This circumstance he was never after sensible of. He joined his corps at Paris, but had not been more than ten weeks there, when severe pain again arose in the bowels; some bits of cloth were passed by stool; an abscess formed externally; and every symptom threatened approaching peritonitis, which was relieved by active means, under the charge of Staff-surgeon Dease.

In September 1816, while attending on the major-general in command of the south-western district of England, this man was brought before me for inspection, and I immediately recognised him, having seen him at Brussels, and noted some particulars of his case on the spot. I examined him with Mr. Byrtt, the surgeon of his corps, and found the abdominal wound perfectly healed, but with a strong herniary disposition. His general health was good, but if he indulged in a full meal he felt a severe pain in the part. He was subject to obstinate costiveness, and if he allowed the bowels to remain for any length of time in that state, the pain produced in the abdominal region, and particularly in the wounded part, became very severe indeed. The motion of his limbs gave him no pain, although for some time after receiving the wound he was obliged to bend his body in walking, and he performed that movement with considerable uneasiness; but if he stooped or drew in his breath forcibly, he experienced very severe pain. In all other respects, his general health and appearance were in as good a state as before the receipt of the injury.*

Balls sometimes remain in the cavity of the abdomen during life. Botallus gives a case of this kind which occurred to an armourer of Bergamo, in whom the ball entered a little above the right groin. Botallus's rule, with regard to the search after balls

* Other cases of a similar nature have come to my knowledge, and many are to be met with in Ravatot, Schenckius, Mangetus, and Hildanus, as quoted by Percy; to which I would add Paré, lib. 25, chap. 19. Sandifort, who gives three instances in his Thesaurus, vol. ii. p. 120, and Sennertus, lib. 5, capt. 5. pars 4. A case is quoted from Riviere by Plouquet, where a ball had entered the frontal sinus, and was passed by stool. At the attack on Algiers, a seaman was wounded over the ninth rib, and passed the ball by stool. See Dewar's Thesis, "De Vulneribus," Edin. 1818, and Dr. Johnson's Journal, No. IV.

in penetrating wounds of the abdomen, is admirable: "At si inveneris educas, quod si non sinito."

It occasionally happens that the ball lodges near the course of some of the nerves, and hence the patient often becomes subject to pain, numbness of the thigh and leg, obstinate costiveness, and other derangement of the viscera. In a case recently examined by me, the ball entered the right groin, and passed inwards and upwards; although the wound was received fourteen years ago, the patient has suffered ever since from constipation to such a degree, that he rarely, if ever, has an evacuation, without the use of some laxative, an enema, or a suppository. The right lower extremity is affected with numbness, which, on any change of weather, degenerates into actual pain.

Balls very frequently pass directly through the abdomen, evidently wounding the intestines, but without occasioning any protrusion of them at either of the orifices. These cases, like all others of those parts, are extremely dangerous, but are not necessarily mortal. They require the most guarded attention, and the utmost watchfulness of the approach of inflammation, which often comes on most insidiously, and as often insidiously goes off, but not before the destruction of the patient is effectually sealed. The mildest possible application should be employed to the wounds, and no plugging with tents, nor introduction of medicated dressings thought of. Sometimes the effusion of the contents of the intestines takes place very soon after the receipt of a wound; in other cases, especially of gunshot, it does not appear until the eschars separate. In either case, excessive inflammation is what we have to dread, and the lancet alone is our remedy, used, not at stated intervals, or for measured evacuations, but unhesitatingly employed, whenever pain and tension call for it, and continued until the pain is moderated, or the fainting of the patient prevents its farther use. The intestine, although not primarily penetrated, yet sometimes sloughs from a wound of the abdominal parieties, and sometimes from the injudicious intrusion of art, particularly the insertion of setons. In all these instances an artificial anus is produced. In fortunate cases, this unseemly alternative is only partial and temporary; in some, however, it continues through life; and most fortunate the patient may consider himself to escape in this way: the establishment of the new passage, being the test of his recovery from the immediate dangers of the wound, any attempt to prevent this, beyond cleanliness and moderate pressure, during the high inflammatory stage, is extremely reprehensible, and endangers life for the probability of preventing inconvenience.

The following cases are worthy of notice.

CASE LXVI.

Artificial Anus.

William Jackson, 3d battalion royals, received a severe confusion from a splinter of a shell at the siege of St. Sebastians, on the 25th of July 1813. It struck him on the right side of the abdomen, at a point nearly central, between the spine of the ilium and the umbilicus. He was put on board ship to be conveyed to the general hospital at Bilboa, and on the passage the contused part sloughed off, about six days after the injury. On the first time of going to stool, and for four months afterwards, feces proceeded from this point, but none passed through the regular channel. He was placed under my care in the last week of August. The following is a statement of the appearances then observed:—On removing the dressings, which he always did on feeling an inclination to evacuate the feces, a circle of reddish-coloured skin appeared, somewhat discoloured with a bilious tinge at its edges, the circumference of which might be about three inches. In the centre was a small puckered protuberance, or papilla, about the size of the point of the little finger. When the feces appeared, their exit was slow and uniform; the papilla gradually expanding, so as to admit of their passage; and, during the whole time of their expulsion, a gradual eversion of the coats of the intestine took place, so as to give the appearance of a fleshy ring. On the expulsion being completed, the ring regularly and slowly corrugated itself, and was withdrawn inwards, presenting, on a small scale, precisely the same appearances as the rectum of a horse after dunging. The treatment was of the most simple nature; cleanliness, moderate pressure by a pad and bandage of his own contrivance, and a regular diet; while, to solicit the natural discharge, I recommended the occasional use of a suppository of Castile soap. About two months after being received into hospital, he, for the first time had a stool by the regular passage, from which period the artificial one began gradually to close; and in about five months, it had contracted to less than a fourth of its original size, being scarcely perceptible, and no feces issuing from it. The general health of this man had not suffered in the smallest degree, which, I think, was to be attributed to the adhesion between the intestine and the abdominal parietes having been completed before the sloughing took place, and the parts became more exposed, and to the very mild and unirritating treatment that was subsequently adopted.*

* Dr. Charles Forbes, the principal medical officer at Bilboa, under whom I served as Staff-surgeon, often saw poor Jackson.—A very instructive case,

CASE LXVII.

Artificial Anus.

James Monaghan, 40th regiment, was wounded on the 28th of July, 1813, by a musket-ball, which struck him in an oblique direction, and entered exactly over that part of Poupart's ligament of the right side, under which the artery runs. Its internal track cannot of course be ascertained, but it went out at a point of the left or opposite side, nearly corresponding to that at which the sciatic nerve and posterior crural vessels pass. He immediately lost all power of moving the right limb, while the left was very much benumbed; and on the first occasion of his going to stool after the receipt of the injury, he passed a very large quantity of clotted blood, mixed with feces, and perceived excrementitious matter and flatus issuing from both orifices made by the ball. This discharge occurred on each occasion of going to stool; it continued at the posterior orifice for five weeks, at the expiration of which period that wound healed. The feces, however, still continued to be discharged at the groin for six weeks longer; the posterior wound then broke out afresh, and the feces were discharged from it as before. It then, after a few days, healed, and again opened; this happened successively for three periods, at each of which fecal matter passed from the wound. During the early part of the cure he had been almost constantly in a state of constipation, and had received daily enemas. He had never suffered any other serious inconvenience, and had not been bled from the arm, but the hemorrhage, on his receiving the wound, he described as very profuse from both orifices, and as reducing him to the greatest imaginable degree of weakness. His treatment under my direction was of the most simple and least irritating nature possible; by it the posterior wound became firmly cicatrized, and the wound of the groin nearly so; nothing but a small sinus which had formed on the fore part of the thigh retarding the perfect healing, and this was very shortly afterwards effected. Whenever this man went to stool, he felt a sensation as if the feces and flatus passed freely along the course of the intestine, until their arrival near the groin, about the sigmoid flexure of the colon, at which period he was obliged to support the hip by pressing upon the site of the posterior wound with the palm of his hand, before he could make

much resembling this, is given by Vater in the Philosophical Transactions; it took place in a camp follower, wounded at the Battle of Ramilles, and continued for fourteen years. Abridgment by Lowthorp, vol. iv.

an effectual effort towards the expulsion. His general health had never suffered, and he was discharged with no other inconvenience than a slight limp of the right limb, and the necessity above described, whenever he went to stool. How the blood vessels and great nerves escaped here, I cannot pretend to explain; that the latter were closely brushed by the ball, the paralytic affections evidently proved.

CASE LXVIII.

Severe Wound of the Thigh and Intestinal Canal.

Private Jonathan Carter, 2d battalion 1st foot guards, was wounded at Waterloo, on the 18th June, 1815, by a musket-ball, which passed obliquely through the long head of the triceps adductor of the left thigh, entered and passed through the lower part of the pelvis below the bladder, wounded the intestineum rectum, and passed out through the inferior portion of the right os ilium, leaving a slight degree of laceration in the gluteus maximus muscle. In order to explain the very extraordinary course of the wound, it may be necessary to state that the patient, when wounded, was in the act of kneeling on the right knee, in the front rank of his corps, preparatory to receiving a column of French cavalry, which was advancing in front of them. He was brought into hospital, and had his wounds dressed on the third day after the action. During the first six days after his admission into hospital, his stools were passed involuntarily through the anterior orifice of the wound in the thigh, but no part of them was ever passed by the posterior orifice in the ilium. From this day, (27th June,) they were passed partly by the anterior orifice of the wound, and partly naturally, at the intervals when he was usually called to stool, until the 20th of July, when the whole of the fecal discharge took the ordinary course. The posterior orifice had now cicatrized, and the anterior, gradually assuming a more healthy appearance, was ultimately cicatrized on the 20th August following. The only medicine administered to the patient during the whole of the cure was an occasional laxative, according as the state of his bowels required it, in order to render his stools more liquid, and to facilitate their egress through the wound. His general health continued invariably good; and, at the period of his discharge from hospital, he was nearly equal to the performance of his military duty.*

Injuries of the abdominal parietes from shot and shell, although they do not penetrate, often leave a great weakness in

* Communicated by Mr. Reid, Assistant-surgeon, 25th regiment.

the part, and a strong disposition to herniary formations, either of the stomach, intestines, or bladder; hence, a circular belt should always be worn in those cases, and the same precautions used by the patient as if hernia had actually taken place.

I have hitherto touched upon those wounds only, which require very little mechanical aid from the surgeon. Of this class are by far the greatest proportion that occur in military practice. The older practitioners were very much averse from leaving any thing to nature in cases of abdominal injuries, although their universal employment of sutures ought to have convinced them how much she could bear with impunity; for there can be very little doubt that their uniform performance of the operation of *Gastroraphy* was at least superfluous, if not positively hurtful; in the course of a very extensive practice, two cases only have come under my notice where it was required to a wounded intestine, though frequently it may be needed for injuries to the parietes. Indeed, the surgical world have long since dismissed their fears about the intestine falling inwards, and about the difficulties of distinguishing between the right and the wrong end of it. The apprehensions of abdominal effusions are now also pretty well subdued. The occurrence is extremely rare, and when it does happen, we leave the poor wretch to die in peace, without searching after effused fluids, the nature of which cannot be known, or, if known, the information cannot in the most remote degree lead to recovery. I have never witnessed a case where any possible good effects could follow the paracentesis, for peritonitis in its most exquisite form has always preceded the symptoms which would lead to the performance of that operation; I by no means, however, would deny the *possibility* of the occurrence of effusion, and its relief in this way; for from Vacher, Petit, and other good authorities, we know it has happened; but in the military hospitals, to which I have had access, effusion has been invariably fatal.

The great practical point of difference among modern surgeons, in the only operation now acknowledged by them, is the mode in which the suture should be applied. Mr. John Bell insists on the interrupted, Mr. Travers recommends the continued. The former takes one, two, or more stitches, the latter holds the wounded extremities of the intestine in contact in their entire circumference. Having only practised the mode by a single stitch to the abdominal parietes, and then closed the wound, I can speak of it alone. The cases were simple: in one a shoemaker's knife, in another a sabre, had obliquely cut a small portion of the colon of about an inch in length, which had protruded, and on returning it to the cavity of the abdomen, the slit exactly corresponded to the external wound. I

cut off both ends of the ligature, as recommended by Mr. Benjamin Bell, (although the first step towards that improvement seems to have originated with M. Verdrier, who, in 1731, observing that the ligatures in gastroraphy occasioned a greater flow of matter than all the rest of the wound, cut off one of the threads,*) a perfect cure was effected in a few days in both cases. Of Mr. Travers' mode, which has been found successful by others who have had an opportunity of employing it, I have no personal experience.

If the intestine is strangulated in a small opening, a few cautious touches of the bistoury will be sufficient to ensure their reduction; and if it be not highly inflamed, or evidently disorganized, it may be returned unsecured.

A soldier of the 38th regiment, under my inspection, at Gloucester, was gored by a cow; the intestines protruded, and, although the peritoneal coat was lacerated, the bowel was returned, the wound was retained together by straps and simple dressings, and, when I last visited that city, I found the man recovered, under the able care and superintendence of the surgeons of the county hospital.

I conceive it to be quite useless to dilate the ends of a divided intestine in order to remove supposed stricture, as practised by some French surgeons, because this apparent stricture is the means which nature employs to produce a reparation of the injury; the ends of an incised wound being always (according to Mr. Travers) drawn asunder and everted, with a broad and bulbous lip, from the contraction of the circular fibres behind it producing relatively to the inverted portion the appearance of a cervix; hence the slitting might, in this case, be carried on as long as there remained any intestine to slit.

If the opening in the parietes is small, an adhesive strap and bandage is sufficient; but the openings, particularly by round shot, or shell, are sometimes so enormous as to admit the protrusion of the stomach, bowels, or bladder, and to require a very extensive use of the suture with the assistance of bandage and adhesive straps. The introduction of sindons of linen, and plates of lead, have also been used; and in those cases, an ingenious French surgeon (M. Desport) has proposed, in the 3d volume of the *Memoirs of the Academy of Surgery*, a peculiar mode of performing the gastroraphy, by which the thread sufficiently supports the part, and may be loosened at will. In a very few singularly fortunate cases of this kind, life has been

* *Memoires de l'Academ. vol. iii. p. 69.* See a very interesting case of sewing the intestine, and drawing the ligatures out at the external wound, performed by Mr. Peter Travers at Lisbon, in 1757, recorded in the *Philosophical Transactions*, abridged by Hutton, Shaw, and Pearson, vol. ii. p. 73. The patient was perfectly cured on the 35th day.

preserved; but this event does not take place in one case of a thousand, and almost instant death succeeds the injury. The sudden shock, and the withdrawing their usual support from the abdominal contents, seem quite sufficient to produce the fatal event.

I have, however, seen two cases, where the destruction of the patient was not *immediately* effected. In one, the great arch of the colon was completely laid bare by a round shot, and the patient was reported to me alive within a week after the event; (indeed, I may here observe, that injuries of the colon are by no means so dangerous as those of other parts of the canal;) the other was a truly melancholy picture of the dreadful effects of the explosion of a shell. An officer of infantry was brought into the hospital of the Jesuits at Brussels in a wagon; he was laid on a mattress in the room used as an operating room; and was in his turn examined by myself and the other surgeons employed on the occasion. Surrounded though we were by the dead and the dying, this case was pre-eminently horrible; almost the whole anterior part of the abdominal parietes had been blown off, with the exception of the peritoneum, which still remained, though extensively lacerated, and deprived of the muscles; where the umbilicus had been, there was a large rent through which the omentum protruded, though not to a great extent, and scarcely above the surface; spots of the stomach, and of the arch of the colon, were visible through smaller rents, and, what was remarkable, no part of the intestines protruded through these openings; but the most singular circumstance was, that this wretched remnant of life conversed and took some refreshment, for which he repeatedly called during the forty-eight hours that he survived. No opportunity occurred of examining the body after death, although I was very anxious to observe whether nature had made any efforts towards a reparation of the injury, or had excited the parts to any peculiar action.

For much of our knowledge of injuries of the intestines we are unquestionably indebted to the valuable observations of Hévin, Petit, and other writers, in the Memoirs of the Royal Academy of Surgery of Paris, (which it is to be feared have not been referred to, with the same freedom that they have been made use of,) to the "Medecine Operatoire" of Sabatier, and to the unrivalled Memoir of Scarpa, now rendered familiar by the publication of it by Wishart in an English translation.*

To Mr. Travers † we owe a very learned and laborious work on the subject, in which he confirms the experiments of Profes-

* Scarpa on Hernia, Edinb. 1814, Memoir 4th.

† An Inquiry into the Process of Nature, in repairing Injuries of the Intestines. London, 1812.

sor Thomson, which show, first, how nature disposes of the ligatures; and, secondly, the greater danger of stitching *longitudinal* than *transverse* wounds: he also illustrates the process employed by nature in the reparation of intestinal injuries. By his experiments on brutes, Mr. T. confirms the observations of Scarpa upon the human subject.

Mr. Astley Cooper, in his valuable work on Hernia, has greatly increased our knowledge of the pathology of the parts, and illustrated the practice; as has also Mr. Lawrence, in his excellent volume upon the same subject.

Mr. John Bell adds to his Discourse on Wounds of the Belly, a particular illustration of the modes of securing a wounded intestine, and by a plan of the Rahmdorian mode, shows its probable danger; it may, however, safely be asserted, that this proposal, which originated with the German author, and is detailed by Heister, is in most cases absolutely impracticable. Another work which may be consulted with great advantage, and which is rich in references to cases both successful and fatal, is the Dissertation of Vogel on wounds of the Colon, to be found in Sandifort's Thesaurus, volume the second.

The wounds of the fixed viscera of the abdomen, though highly dangerous, are not necessarily mortal; the simple principle of avoiding or subduing inflammation must guide us in the attempts at relief in these cases. All deep wounds of the spleen, liver, or kidney, are almost immediately fatal from hemorrhage; some instances, however, occur, where even severe injuries are survived.

The slightest reflection on the situation and structure of the kidney, and on its various sympathies, will at once show the desperate nature of wounds inflicted on it, even with all the caution of a curative intention. In the excellent and learned memoir of M. Hevin on Nephrotomy, this point is most amply discussed and illustrated, and a great mass of evidence is produced on the subject.* The instances that I have observed where recovery has been established are very few indeed. If the patient has survived the first hemorrhage, the fever and peritoneal inflammation, with incessant hiccough and vomiting from sympathy of the diaphragm and stomach, have generally cut him off; and if he has for a time escaped, excruciating pains, profuse suppuration from fistulous sores, hectic, and emaciation, have terminated his existence. Where the cure has been effected, there is reason to think that the ureter has been but slightly brushed, and the body of the kidney itself left un-

* Recherches Historique et Critiques sur la Nephrotomie ou Taille du Rein, par M. Hevin, Memoirs de l'Academie Royale de Chirurgie, tom. iii. p. 238, fol. edit.

touched. The remedies consist of venesection, mild purgatives, as manna, oil, &c., frequent emollient enemas, the warm bath generally, and local fomentation, so as to excite diaphoresis and moderate urinary secretion; with a diet of the mildest kind, but much restricted in fluids, the indulgence in which, even in small quantity, should be avoided. Stimulants under any form, particularly those which can at all influence the urinary organs, as blisters, diuretics, &c. are decidedly hurtful. The dressings should be extremely light, so as to admit of the free percolation of the urine; the neighbouring parts should be varnished over with some unctuous substance, to prevent excoriation, and the bedding should be guarded by an oil skin. By these means a few cases that have come to my knowledge have terminated favourably.

The following case appears to me very valuable. It is perhaps among the most singular on record, and it illustrates the whole series of symptoms attendant on injuries of these parts. It is told principally in the plain and unadorned language, of a soldier, who relates what he felt, without any fixed ideas of the nature or functions of the organs the lesion of which he describes. The authenticity of the facts is unquestionable, as, independent of the officer's own history, they have all been corroborated by the testimony of his medical attendants.*

CASE LXIX.

Complicated Wound of the Kidney.

“On the 9th December, 1813,” says this brave man, “I received a dangerous wound from a musket ball through the body, which entered the right side. The surgeon of the regiment being nearly on the spot at the time I was wounded, had me moved in a blanket to the nearest house, where he instantly examined me, and was about to extract the ball; but, from the extreme agony in which I was, and from my immediate death being apprehended, he desisted from the operation, and in one return I was actually stated as dead. As nearly as I can recollect,

* Messrs. M'Leod, Hill, and Ryan, surgeons to the forces, Mr. Dunn, surgeon 23d fusileers, Messrs. Thonison and Ekins, assistant-surgeons 38th regiment, and Mr. Mayow, surgeon, Winchester. On examination by me in December 1816, in presence of Staff-surgeon Hughes and Dr. Knox, at Hilsea, the cicatrix of the wound at the entrance of the ball was found to be close to the interval of the 9th and 10th ribs, about midway between the sternum and vertebrae, and the ball was cut out about the point of the transverse process of the lowermost dorsal vertebrae the day after the receipt of the wound.

lect, in one hour after being wounded, the surgeon ordered some tea to be made, and had me moved near a fire. On this movement I expressed a desire to pass urine, which flowed very copiously, and was a second cause of alarm, as it had more the appearance of blood than otherwise. This symptom put an end to all hopes of recovery on my part. On account of the whole army retreating this evening, I was unavoidably moved to the rear, nearly a distance of three leagues, the pain induced by which exceeded description. In less than an hour, while in the wagon, I again passed a quantity of blood, far more visible than before, as it deeply stained every thing that it touched. On my arrival at the quarter destined for me, Assistant-surgeon Ekins bled me, and an enema was administered. I now began, in addition to the pain in my wound, to feel considerable pain from inflammation in the bowels. I soon became delirious, and cannot describe how I was affected for a considerable time; but I understand I was several times bled to keep back the inflammation. I recollect that, on my reason returning, I sent for a surgeon to examine my *right shoulder*, as I could not be persuaded, from the pain I felt, but that I was wounded there also. This was not the case. For fourteen days I understood no other nourishment was given me but small draughts of tea. I recollect that large blisters were applied to my belly and breast, and that I drank several draughts, and took several pills to compose me. The wound in my back nearly mortified by my lying so long. I thought I should never recover the use of my arm, and I could not stretch out my legs, particularly the right one. I also suffered great pain between the wounds, and do so to this day, and I must be very cautious in raising my body suddenly. In about seven weeks I was removed farther to the rear and sent to England."

This gentleman arrived in England; and, after passing some time in London, proceeded to the dépôt of his corps. In consequence of the journey, fever was excited, which proceeded to a considerable length, and peritoneal inflammation again attacked him. On the second day after this attack, a tumour formed in the site of the posterior wound, which in about a fortnight was punctured, and discharged nearly six ounces of purulent matter, of a urinous smell. The discharge continued for some time, and another abscess formed lower down, which was punctured in about three weeks, and a large quantity of pus of the same kind was discharged from it. The discharge varied in quality from time to time, and the abscess occasionally healed and burst open again. In the meantime, the pain and emaciation were very great; and the quantity of urine diminished, with very frequent calls to pass it. In this way he continued, with little variation, and with small hopes of recovery, until the end of July. I shall

now resume the narrative in his own words. "I lingered in this state, constantly using medicine to enable me to pass urine, as it was supposed I had the gravel. The passage of the urine became every day more difficult, and I found that the extreme pain I felt moved first from my side to my belly, and gradually on to the testicles, and latterly to the penis. The flowing of the matter continued great, and very much savoured of urine; my skin was at times exceedingly fair, and at others completely yellow; and my eyes glistening, and the white at all times discoloured. I at last became so exceedingly uneasy from the frequent attempts to pass urine, (which every day diminished in quantity so greatly that I could not at length evacuate more than by drops,) that I was reduced to a state of frenzy, when, about twelve hours before the following extraordinary event took place, the discharge from my wounds, which had been lessening for two days before, suddenly stopped; the pain and the pressure of urine became so great, that I could no longer exist; all my efforts were vain,—nothing but drops would pass. While in this state of agony the surgeon was sent for. Before he arrived my desire increased, when another attempt was made, but with less effect than before. I remained in the greatest torture for more than three minutes, when a burst of urine took place, and with it a *lump*, which struck forcibly against the chamber pot; the most uncommon quantity of urine followed, coloured with blood; and in less than an hour another discharge, having less colour of blood than the former. On the arrival of the surgeon the chamber pot was examined, when a *lump in the shape of a short thick shrimp*, was taken out, which was that night thought a stone, being covered with black grit, and very hard. One side was lighter than the other, where I suppose it was fastened to. It was placed in a glass, and in the morning all the surgeons examined it, by which time it became dry, and on being pressed it clearly appeared to be *cloth*, which had been driven in by the force of the ball. I believe, that the great pain I felt in the side, and, as it made its approaches, was solely occasioned by its movement; and also, that it remained some time near the bottom of the testicles and penis. I do not hesitate to say, that it has injured the parts of the passage, from symptoms I now feel."

This officer is now in good health. He keeps the cloth as a relic. It is three quarters of an inch long, and tapering to a point like a pie-e of the end of a bougie. Two projecting shreds, like antenuæ, now gone, but which originally belonged to it, gave it the appearance of the shrimp which he describes.

In this case, the passage of the cloth from the wound in the breast, across the body, through the ureter into the bladder, and thence by the urethra, can admit of no question; the dilatability of the ureter and urethra, is sufficiently great to admit

of the passage of much larger substances, formed within the body, or casually introduced.

The cases on record of recoveries after wounds of the kidney are not numerous. The excellent Haller gives us one in his Opuscul. Patholog. Obs. 69; and Bourienne furnishes another in the Journal de Medecine, tome xlvi. p. 554. There is also a case by Dr. Borthwick in Duncan's "Annals of Medicine," for 1799, where a wound was inflicted by a sword, and the patient recovered. Wounds of this part are treated of by almost all the systematic writers. A special dissertation on them was published by Gittler, at Leipsic, so far back as 1596, the only monograph, with the existence of which I am acquainted.

Wounds of the bladder are dangerous, in proportion as it is full of urine at the time of their receipt, or as the upper and anterior, or lower and posterior part of the viscus may be wounded. If the intestines are implicated in the wound, it is highly dangerous; if a ball passes through the bladder when it projects above the pubes, the case may be considered mortal. Inflammation from wounds of these parts runs rapidly into gangrene, from the delicate nature of the organs wounded, and the increased irritation proceeding from the effusion of the urine, and its filtration through the cellular substance, which completely destroys all its natural connexions. If there is a free extensive passage externally, much of this danger will be obviated; and after the first effusion from the bladder has taken place, the judicious use of the elastic gum catheter affords us an admirable assistance against this accident; indeed, without this useful instrument, our practice in wounds of this nature, and in those affecting the urethra, would be merely confined to looking on and moderating symptoms, instead of preventing them, as we are now enabled to do. With the aid of the catheter, I have seldom met with any cases of wounds of the bladder and urethra, which required more than an antiphlogistic regimen, an open state of bowels, mild dressing, and cleanliness; to which, if the edges of the sore have become irritable, a mild solution of the nitrate of silver, applied with a camel's hair pencil, has been added. I have very rarely had occasion to use the knife for the enlargement of the wound, or to pare its edges, when I have treated the case from the beginning, or where the catheter and proper dressings have been employed. A perfect cure is the general result in sound healthy constitutions; but, in habits of a different kind, and more especially if they have been hard drinkers, the reverse is the case, and the most distressing symptoms, as repeated sloughings, foul and deep ulcerations, or fistulous sores, remain.—I presume it is superfluous to speak of the stitching this organ, as a means of remedying its injuries.

Extraneous bodies, particularly balls and morsels of bone,

are frequently carried into the bladder, either as it rises above the pubes, or through openings in the pelvis, and they come off by the natural passages, or are removed by a surgical operation, conducted on the same principle as that of lithotomy.

If extraneous matters carried into the bladder are of a soft yielding nature, or of a small size, the natural flow of the urine often carries them out. Of this the following are examples:

CASE LXX.

Passage of Cloth by the Urethra.

James Rowan, of the 50th regiment, aged 44, a man of a very robust constitution, was skirmishing in front of his corps in the Pyrenees, on the 25th of July, 1813, when he received a musket ball, which, passing through the skirt of his regimental jacket, entered a little above the tuberosity of the left ischium, in a direction towards the sacrum, and lodged, as was supposed at the time, in the neighbourhood of that bone. The swelling of the soft parts was so considerable, and the general inflammatory symptoms ran so high, that when he was carried to the field hospital, it was deemed improper to probe much after the ball. He was, therefore, freely bled; his bowels were well opened; and emollient applications being applied to the wound, he was sent down to the general hospital, at the convent of St. Domingo, Vittoria.

On the subsidence of the inflammatory symptoms, several attempts were made in search of the ball, but with no other effect than to convince the assistant, under whose charge he was more immediately placed, that it did not occupy the situation originally imagined, but had passed onwards directly into the pelvis.

The patient's general health did not suffer; the wound was scarcely more troublesome than a common flesh wound, and was unattended with any peculiarity in the appearance, or in the character of the discharge; in short, he was so far recovered in the course of three weeks, that he was sent down to the general hospital at Bilboa in a covered wagon, along with a numerous escort of wounded, a distance of nineteen leagues. On his arrival, he complained of being a good deal shaken, but the wound was nearly healed, and, on the most minute examination, no trace of any extraneous substance could be discovered in it. There was every reason, however, to suppose that the bullet was lodged in the neighbourhood of the bladder, for he complained of a dull sensation in the glans penis, with numbness and coldness of the testicles, attended with great pain in making

water, and occasionally an inability to retain it; there was, nevertheless, neither stoppage nor tortuosity of the urinary stream.

The wound was perfectly healed in the first week of December, or about 130 days from its infliction, when he was discharged to the convalescent dépôt, where he remained for six days, when the uneasy sensations of the urinary organs arose to actual pain, which he attributed to his change of bed, and his not living so comfortably as he did in the hospital. For this grievance he had recourse to a soldier's remedy, and drank as copiously of country wine as his finances would allow. After having committed a debauch on the evening of the 8th day from his quitting the hospital, he was seized with an irresistible desire to make water; and, after some severe straining, in which he was sensible of an obstruction about the neck of the bladder, which for fully half an hour prevented the passage of a single drop of urine, he shot out of the urethra, with a convulsive jerk, a substance coiled up, somewhat in the shape of a fragment of a large bougie, nine lines in length, and three in breadth, the ejection of which was followed by a profuse flow of urine, passed without any muscular exertion, and succeeded by instantaneous relief. On examination of the ejected substance, it proved to be two bits of cloth, consisting of his jacket and its lining, corresponding with the size of the shot-hole. The texture was unaltered, but the colour of the red piece was much faded; it had neither any urinous smell, nor was any calculous concretion observable on it.

I had an opportunity of examining this man in February 1814; the wound was perfectly cicatrized, and no disorder of the urinary organs was present; but not the slightest trace of the ball could be discovered, either by the sound, or the finger, introduced into the anus.*

CASE LXXI.

Passage of Bone by the Urethra.

T. D. aged 39, a soldier of a light infantry corps, was wounded by a musket ball on the evening of the 18th of June, 1815. It entered the pelvis at about one inch and a quarter from the symphysis of the pubes, grazing close to the bone, and came out, unaltered in shape, through the buttock of the same side, about three inches from the sacrum. In this course the bladder, which was much distended with urine, was injured; great

* This case I published in the 5th volume of the London Medical Repository. p. 283. The cloth is in possession of my friend, Mr. Thomson, lately one of the editors of that work.

stupour and pain of the part were experienced on the receipt of the wound, and particularly affected the loins, and testicle of the wounded side. He had a strong inclination to void his urine immediately after the receipt of the wound, and in doing so it passed entirely through the anterior opening over the pubes, and not a drop by the natural channel; the efforts to pass it were attended with severe pain. When my attention was particularly called to him, in about four weeks after his wound, I found that the urine still passed, but in small quantities, from the upper orifice; the posterior one had closed, and the other was inclined to heal. The urine had been almost constantly carried off by means of an elastic gum-eatheter, but, notwithstanding, an abscess by infiltration had formed on the inside of the right thigh; from this abscess, some small pieces of bone, to the amount of about twenty grains in weight, and the largest of about the size of a grain of coarse gunpowder, had passed at different times. The urine drawn off from the bladder was in general turbid, and, on being allowed to deposite its sediment, about three drachms of osseous grit had been collected from it at different periods. After some time he began to pass the urine partially by the natural passage, and the same osseous grit was deposited, while a discharge of more palpable bony particles appeared in the stream; these were collected from time to time, and amounted to three drachms in weight; the largest piece was circular, flat like a piece of coin, and of the size of a split pea. The man was transferred from my care and sent home to England. I saw him eight months after; his general health was good, but the osseous discharge still continued. He presented me with some few pieces of the bone, rough and angular, about one-third of an inch in length, and one-fourth broad, which had all passed by the urethra, and weighed together about an additional drachm; and also one piece which had passed by the wound, of about the same size as the others, but smooth on one surface, evidently an exfoliation direct from the pubes, without having been acted on by the urine.

An interesting case, in which a piece of bone nearly an inch in length, and about the thickness of a crow's quill, was passed by the urethra, is detailed by Mr. Douglas, late of the 8th regiment, in the Edinburgh Medical and Surgical Journal, vol. xiii. p. 314.

Air is sometimes, but very rarely, passed from the bladder, most probably from some opening in the ureter communicating with an external wound; or, as in the cases mentioned by Camper,* from ulcerations connected with the intestines. I saw a

* *Demonstrat. Anatom. Patholog. Lib. ii. p. 16.* See also a case by Dr. Fo-thergill—*Duncan's Medical Commentaries*, vol. ii. p. 194.

case of this kind at Brussels, and Dr. Theodore Gordon, physician to the forces, has most obligingly favoured me with the following notes of it:

CASE LXXII.

Passage of Air by the Urethra.

Augustus Labiche, 7th French dragoons, was wounded 18th of June, 1815, by a musket ball, which entered the left hypochondrium, directly under the 12th rib, near its anterior extremity, and came out to the left of the 2d vertebra of the loins, close to the spinous process. Some blood passed through the urinary passage the first few days after receiving the wound. Up to the 13th of July, the discharge through the wound on the back was very copious, and mixed with thin fæces, and with the seeds of fruit which he had swallowed; the wound under the rib discharged very little. On the 14th of July, he, for the first time, had a sensation as of air passing through the urethra, with a gurgling noise after discharging the urine. On the 16th, the wound on the back was healing up, and the fæces ceased to pass. On the 20th, the bed-clothes and bandages betrayed a strong urinous smell, and urine was observed to pass from the posterior wound; the noise formerly heard on making it now ceased, but on passing it with the penis immersed in water, about a cubic inch of air bubbles made their appearance. The passage of air bubbles from the urethra, and of urine from the wound in the back, had ceased entirely about the 8th of August, (or the 51st day from the receipt of the injury,) and the wounds in both the side and back were considerably diminished. In a few days after this he complained that he wanted to pass wind, he felt an acute pain in the wound, as if the air had first proceeded there, and then had passed off *per anum*. The pain continued to increase, and the wound to assume a fistulous disposition, till, on the 57th day, the air again began to pass both from the wound and the urethra, and a slight gonorrhœa appeared. He soon after began to recover fast. The change of the medical officers, who were removed to other duties, and the restoration of the prisoners to their native country, prevented the continuation of the notes of the case; but the impression on Dr. Gordon's mind is, that the man finally recovered. The external treatment of his wounds was confined to simple dressings.

Where a ball has struck the region of the bladder, if its force is weakened by distance, or broke by encountering the elastic integuments and the coats of that organ, and still farther resisted by the presence of a quantity of urine, it sinks down

through the fluid, and often remains unnoticed amid the other circumstances of the wound, until it gives rise to a train of symptoms, which ultimately call for the incision of the bladder. This operation, which has not been unfrequently resorted to, has lately been successfully performed at the York hospital, Chelsea, by Mr. Guthrie. A similar operation was performed at St. George's hospital on a soldier, who was shot in the bladder at the siege of Lisle, and operated on the spring following; a view of the calculous concretion is given by Cheselden, in his book on the High Operation, London, 1723, plate x. Garengeot, in his *Traité des Operations*, vol. i., p. 17, gives a case of an officer, cut for a stone, the nucleus of which was a musket ball, which remained in his bladder ten years; and Hildanus gives a case where a ball remained for thirty years in the bladder, *Cent. 3. Obs. 67.*

Depositions of calcareous matter are often formed in the bladder after its coats have been injured by a wound. In a case lately operated upon by Staff-surgeon Dease, it was nearly filled with loosely compacted urinary depositions, part without any visible nucleus, some masses with splinters of bone for their nuclei, and, in several points, the calcareous crust adhering to the internal coat of the bladder itself. The patient was wounded in the anterior part of the viscus, and suffered most severe torture during the protraction of his life for three years. Circumstances forbade the examination of the body after death.

A splinter of bone is, in most cases, found to be the nucleus of the deposition of calculous matter. Baron Larrey prefers this operation in recent cases to the attempt of extracting a ball by the passage through which it has entered, as the wound in the external parts, and in the bladder, will not correspond in consequence of the sinking of the latter organ.*

It has been found by Dr. Marcelet, who analyzed the calculus extracted by Mr. Guthrie, which I have alluded to above, that in all cases where depositions have been formed, or extraneous bodies introduced into the bladder, they have been of the *fusible* species.†

Wherever it is probable that a ball, cloth, or large portion of bone is lodged in the bladder, it unquestionably becomes our duty to extract it at once by the original wound, if possible, without the more formal operation of cystotomy. We know, indeed, that balls have been passed by the urethra,‡ but no prudent surgeon would trust to such an event. An ingenious idea of dissolving the ball by means of crude-quicksilver was started in

* *Tom. iv. p. 385, et. seq.*

† See his *Essay on Calculous Disorders*, 8vo. London, p. 75.

‡ *Paulinus, Cent. 3, Obs. 49. Ephemerid. Nat. Cur. Dec. 2, S. Larrey, vol. iv.*

France; Le Dran instituted some experiments on the subject; he effected the amalgamation of lead with mercury in a vessel filled with urine, and brought to the heat of the body; he went a step farther, and thrusting some lead into the bladder of an ass, conceived that it had been there dissolved by quicksilver; he then operated upon a West Indian governor by the mercurial injection, for the removal of a piece of leaden bougie, which had broke short in his bladder. All France rung with his new and ingenious operation, and the contriver was so far deceived as to affirm that the lead was discharged; but on the governor's death, which occurred some time after, the identical piece of lead was found in his bladder.* The use of mercury has also been at times adopted for the removal of leaden balls from other parts, but without success; in some cases, it has insinuated itself among the cancelli of the bones, the fibres of the muscles, and the tendinous sheaths, and produced great irritation.

Paralysis of the bladder is also a common effect from blows of shells, &c., and an actual diminution of its cavity occasionally takes place by its thickening and adhesion to the pubes and other adjoining parts; rupture also sometimes occurs without any external solution of continuity. Time and moderate external stimuli are useful in the first case; the antiphlogistic regimen, in all injuries, will go far to prevent the second; but the last is an occurrence uniformly fatal.

In addition to the observations upon the wounds of the bladder by the systematic writers, the military surgeon will derive much information from Garangeot, and from Desportes, in the "Operations De Chirurgie" of the former, and the "Traité des Playes d'armes à feu" of the latter. Bordenave, in the Memoirs of the Academy, 2d vol., Bourienne, in the "Journal de Medecine, tome xxix., and Thomson, in his "Report," are also well worth consulting. But the most instructive cases that, I believe, are to be met with, will be found in the "Memoires of M. Larrey, particularly in the fourth volume. No special treatise exists, to my knowledge, upon the wounds of the bladder.

A deep wound of the liver is as fatal as if the heart itself was engaged; the slighter injuries are recoverable, particularly if the membrane alone is injured. The site of the wound at once points out the organ affected, and the suppressions of some of its functions almost invariably succeeds.

The usual symptoms which characterize these injuries are yellowness of the skin and urine, derangement of the stomach, and of the alimentary canal, and cutaneous affections, particularly great and distressing itching. The discharge from the wound is

generally yellow and glutinous, but I have seen it of a serous nature, and sometimes very nearly allied to unmixed bile. The following case will exhibit the symptoms, and the mode of treatment adopted, in a very dangerous and complicated case:

CASE LXXXIII.

Wound of the Liver.

June 18th, 1815.—Lieutenant-colonel H. received a musket shot, which, entering between, and partially fracturing, the 8th and 9th ribs posteriorly, and about two and a-half inches distant from the spine, passed out between the 7th and 8th anteriorly, about four and a-half inches from the sternum. The hemorrhage, which continued for three days from both wounds, was so excessive, that he could not be moved from the neighbourhood of the field of battle. The 11th day he was brought into Brussels, when I saw him, with Deputy-inspector Gunning, surgeon-in-chief, and Mr. Robinson, surgeon of the 16th dragoons. His pulse was then about 90, and hard; his countenance pale and sunk; his eyes glazed, and with difficulty kept open; his skin of a dusky yellow, and bedewed with a clammy sweat; the tongue foul; the respiration difficult, and interrupted by frequent singultus. He had great sense of weight and pain in the region of the liver, but his severest complaint was an inability to remain in one posture, and want of sleep. He had occasional, but not violent, cough, and expectorated some coagula of blood. On examining the posterior wound, I found a copious glairy yellowish discharge, mixed with air bubbles, and some small streaks of blood; the anterior wound was nearly closed. The treatment which had been adopted by Mr. Robinson had been so judicious, that no alteration was proposed; he had bled his patient five different times copiously, and had kept his bowels regular daily with solution of neutral salts, and *ol. recini*. The inflammatory symptoms returned on the night of his arrival, from which time, till the morning visit at six o'clock, he lost thirty ounces of buffy blood at three bleedings. The following are the reports of the case during its progress under my inspection.

12th day.—Extremely low and weak, so as to be scarce able to answer questions, pulse 80, weak and fluttering; he tosses incessantly in the bed, and speaks very incoherently; discharge very copious, thick, and of a deep bilious tinge; belly hard, and bowels costive; cough severe, and he spits up a tenacious yellow mucus, of bitter taste, and offensive smell, but with great difficulty and in very small proportions. He was ordered an emol-

lient glyster, and to drink of a solution of gum Arabic, sweetened with capillaire. 13th day.—Last night all the symptoms became aggravated, so that the Assistant-surgeon, Mr. Bingham, who sat up with him, took 12 ounces of blood away, which immediately relieved him. On examination of the wound this morning, the edges of it, for about an inch round, were ephysematous, and the discharge of a still deeper yellow colour, and more tenacious consistence than before. Up to the 24th day of July, or the 37th of the wound, very little hopes of his recovery were entertained; the bilious discharge from the posterior wound continued copious, and the bilious expectoration the same. On pressing the edges of the posterior wound, the air could be forced out, so as to raise the glairy bilious discharge into a large-sized bubble, but there was no distinct rush during respiration; the anterior wound was nearly closed; he complained of a griping pain in his bowels, and of a great sense of fulness, notwithstanding that he had some doses of castor oil, and his nightly enema had procured him several regular stools; his tongue was foul, and hiccough, which had left him for ten days, now returned. His castor oil was repeated. 38th day.—His eye had very much recovered its natural lustre; his tongue was clean, and he slept some hours quietly. Since the administration of the purgative and injections, he has had 12 stools, with each of which he has passed hardened scybala, mixed with dark bile, and a quantity of matter of the consistence of paste, like moistened pipe-clay. Hiccough and bilious expectoration gone. Asked for an increase of food, which, up to this day, has been either fruit (strawberries,) or some very light gelatinous matter. 40th day.—During the night he was seized with a violent and universal itching over his whole body, but more particularly over the legs and thighs; the skin, however, is free from any eruptive appearance, and is nearly of a natural hue and feel. He was now ordered a nightly warm bath. 41st day.—The discharge from the wound very remarkably changed in quantity and appearance; the quantity was not the fourth part of what it had been, and had lost its bilious hue. Had one very copious bilious stool, being the first without medicine which he has had since his wound; itching still continued unabated. From this day he gradually improved. By the advice of Professor Thomson, he took an occasional squill pill, and every third night about six grains of the mass of blue pill. A few spicula of bone came away from the posterior wound, but without any pain or annoyance; and on 1st of September he had recovered almost perfect health.

The complication was still greater in the following successful case, communicated by Mr. Hughes:

CASE LXXIV.

Complicated Wound of the Liver.

Joac. Cordeiro, private in the 8th regiment of Portuguese infantry of the line, æt. 20, was wounded when carrying a ladder, at the unsuccessful attempt to storm the forts at Salamanca, June 1812. A large ragged shot hole appeared in the centre of his left cheek, passing obliquely inwards and downwards between both jaws, and fracturing the two first molares of the under jaw; its course was followed by the finger to about an inch and a-half before the angle of the jaw, on the inside of the bone, and from this a considerable clot of blood was removed, but no farther trace of it could be here perceived. His breathing was quick and laborious; his pulse frequent and small, and his countenance ghastly. He said he had coughed and vomited some blood, but his chief complaints were acute pain in the opposite shoulder, tightness in the chest, and frequent inclinations to go to stool; his evacuations consisted of dark-coloured blood and greenish mucus in small quantity, and were attended with tenesmus. On examining with my fingers on the outside of the neck, (no line or blush on the skin appearing to guide me in tracing the ball,) a crackling feel was observed about one-fourth of an inch below the bone, close to the inner edge of the mastoid muscle, which was traced in the direction of that edge as far as the sternum, and here it was lost. I began to fear the lodgement of the wounding body in the chest; but, continuing to examine carefully all about the confines of the thorax for farther guidance, I had the fortune to come on a line of similar feel to that of the neck, which commenced about an inch below and to the right side of the umbilicus, and led my fingers to the posterior part of the right hypochondrium; here it stopped on a hard round substance, which I had no doubt was the ball; the tumefaction over it was scarcely perceptible; but on fixing the hard body, and cutting on it to the depth of about half an inch, I extracted without difficulty a four ounce grape-shot; it was followed by a small quantity of dark grumous blood, and I proceeded to take from his arm 18 ounces more, which produced syncope. I directed an emollient enema to be administered, and the abdomen to be fomented; a large quantity of greenish fluid mixed with clotted blood followed the enema; his pulse rose, and became more firm and equable about an hour after the bleeding, when I found him in a disturbed sleep. At noon his pulse was about 112, strong and hard, pain in the right shoulder severe, breathing difficult, and constant inclination to go to stool, with distressing

thirst and headach; evacuations bloody. In the act of taking his arm to repeat the bleeding, he lost about two ounces of dark-coloured blood from the exit of the ball: 20 ounces of blood were extracted from his arm, and the enema repeated, which brought off some clots, with a little green-coloured feculent matter. The fomentation was continued, and a dose of castor oil administered, which, before evening, procured three easy, copious, and feculent motions, the last of which was a little tinged with blood. At the evening visit his pulse was 87, soft and regular; he was free from pain, breathed easily, and complained only of thirst. A slight return of pain in the shoulder, and soreness over the hypochondrium, obliged me the following morning to take away 12 ounces of blood, and from this time he went on invariably well, and commenced the campaign of 1813 in good health.

In this case the ball appears to have passed along the inner surface of the chest, without injuring the lungs; and to have entered the abdomen, where it injured a portion of the intestine and implicated part of the liver.*

From experiments on rabbits lately tried by Dr. Monro, Professor of Anatomy and Surgery at Edinburgh, it appears that considerable portions of the liver may be removed without injuring the health of the animal, the wounds cicatrizing as in other parts. In Blanchard's "Anatomica Practica Rationalis," Amsterdam, 1688, we find the case of a soldier who was wounded by a sword in the hepatic region; the wound was succeeded by a profuse hemorrhage and deliquium; on the cessation of the hemorrhage a morsel of the substance of the liver was removed by the forceps, and after many threatening symptoms the patient recovered. At the end of three years he died of fever: on dissection, a small portion of the lower part of the wounded lobe of the liver was observed to be wanting, where it had been removed by the cutting instrument; the other viscera were sound.

I have not had many opportunities of examining the bodies of persons killed by wounds of the liver, or who have survived slight injuries and died of other diseases; but my attention was very particularly called to the healing of solutions of continuity in this organ, by the results of several dissections made in India, and communicated to me by Dr. Nicol, surgeon to the forces, who served for some years in that country, and who found in many instances the marks of cicatrices on the surface of the liver, which must have occurred in consequence of abscesses

* Loescke, in his *Observationes Anatomic. Chirurg. Med. Berlin, 1754*, p. 7, gives a very remarkable case of a complicated wound, in which a screw exploded from a musket, penetrated the ribs, lungs, diaphragm and abdomen, without destroying the patient.

bursting into the cavity of the abdomen. In some instances, the period of the rupture was clearly indicated during life by the cessation of pain, and the absorption of matter was announced by subsequent rigors. I have had an opportunity of observing the marks of cicatrices on the edge of the right lobe of the liver, in two subjects who belonged to Dr. Nichol's late regiment, (the 80th,) who were affected with liver complaints in India, and died on their return, at Gosport Hospital.

I have never known a patient recover after a wound of the gall-bladder; and, indeed, it is difficult to imagine a case where it could happen without an effusion of bile into the abdominal cavity, except a previous adhesion had taken place to the parietes; a case, however, is mentioned in the "Opuscules de Chirurgie" of Paroisse, p. 255, where a leaden ball had lodged for the space of two years. A case, I believe unique, is reported by Dr. Thomson at page 99 of his Report, where nature had provided against the extravasation of bile from the substance of the liver into the cavity of the abdomen, by the means of newly formed adhesions of considerable extent. Waton, a French army surgeon, gives a fatal case from the puncture of the cyst by a bayonet, in the *Journal de Medicine Militaire*, vol. vii. p. 550, and Sabatier refers to another in his *Medicine Operatoire*, vol. i. pp. 34 and 42.

The observations upon wounds of the liver itself are very frequent in authors. Morgagni, in his 53d Epistle, article 40, gives a very interesting case; and some valuable observations will be found in the works of Desault and Chopart. There are few of the collectors that do not abound in instances, both fatal and otherwise, and some special dissertations are to be found on the subject, particularly one by Kaltschmidt in Haller's Collection, vol. v. and one by De Bergen, published at Frankfort, 1753, and to be seen also in Schlegel's Collection, vol. v. See also a very extraordinary case of an effusion of bile discharged by puncture of the abdomen, *Med. Chir. Trans.* vol. iv. p. 330.

Of the wounds of the Diaphragm, I have never met one unconnected with injuries of one or both the cavities which it divides, or in which symptoms of their being affected did not appear; although I have met with one instance where a musket-ball passed along from the sternal to the vertebral connexion of that septum, precisely following the curvature of the ribs; nor have I, in those cases which have come within my view, ever observed that peculiar spasm, (*risus Sardonicus*,) described by the older authors, and lately noticed by M. Percy. The prevention of inflammation is the leading indication of cure; but injuries are frequently found on dissection, which were not at all indicated during life by any peculiar symptoms. Sometimes the diaphragm is injured in two different points by the same ball; an

interesting illustration of this has been furnished me by Dr. Thomson.

CASE LXXV.

Injury of the Diaphragm in two places, by a Ball.

A lad received a wound from a musket ball which entered the left side between the 10th and 11th ribs posteriorly, and passed out nearly in a direct line beneath the 8th, at the distance of five inches from the sternum; he died on the 5th day. On dissection, a considerable quantity of air escaped from the left cavity of the thorax; it contained about three pounds of bloody serum; the lungs on that side were completely collapsed, though, on inflating them, they did not appear to be wounded; the surface of the lungs, pleura, and upper part of the diaphragm, were covered with coagulable lymph, which adhered very loosely; the ball broke the 11th rib, and drove some splinters of it into the diaphragm, entered the thorax, passed through the septum into the abdomen, grazed the upper surface of the spleen, which was covered with coagulated blood, returned again through the diaphragm into the cavity of the thorax, and passed out below the 8th rib; none of the other viscera appeared to be wounded.

Paré gives us two cases in his 10th book, where the colon passed through an opening of the diaphragm made by a ball, and another, where the stomach passed through one made by a sword. I have already mentioned a case where a hernia of the stomach was found through a hole in the diaphragm, supposed to have been made by a musket ball. M. Ravier, in the *Journal de Med. Militaire*, vol. i. p. 114, gives a case where the principal viscera of the abdomen passed into the thorax, after the receipt of a violent blow on the belly; and Mr. Boyle, surgeon of the 62d regiment, gives a case of hernia of the stomach through a wound in the diaphragm, in the *Ed. Med. Jour.* vol. viii. p. 42. Professor Barthe of Montpelier gives an instance where a part of the omentum passed not only through the diaphragm, but appeared externally through a wound which had penetrated between the 6th and 7th rib; it separated, by the application of a ligature, on the 16th day, and the patient, a healthy lad, recovered. See *Medical and Physical Journal*, vol. x. p. 250. Blanckard gives a case where a ball entered near the thyroid cartilage, and passed under the sternum, making its exit between the 5th and 6th ribs; the colon protruded through the wound into the thorax. He gives another case where the stomach protruded into the thorax, and where there was a displacement of the heart itself which was seen to pulsate on the right side. Observations

1, 2, Century 1st, and 9, 10, Century 2d. Morgagni, valuable on every subject, is highly so on the injuries of the Diaphragm, in his 53d and 54th Epistle; but the most interesting account that I am acquainted with is given in the article "Diaphragme," in the "Dictionnaire des Sciences Medicales," by M. Percy.

Wounds of the stomach are extremely dangerous though not mortal. Baron Percy calculates, that of twenty cases, four or five only have escaped; this, however, is a most favourable average. I have never treated an instance, nor did I see the two reported by Dr. Thomson, which occurred at the battle of Waterloo, one from a musket ball, the other from a pike. They were treated on the mild unirritating plan adopted for wounds of the intestines, and I understand both did well. The histories of the Bohemian, Prussian, and English "Cultrivores," in some of whom the knives have been cut out, and in others discharged spontaneously through the coats of the stomach and parietes of the abdomen, as well as many other instances on record, are very encouraging in cases of injuries of this organ. Mr. Hevin, in his excellent paper in the 1st vol. of the Memoirs of the Academy of Surgery, page 144, has collected a number of interesting instances of recovery, both from incised and gunshot wounds. But the industrious Ploucquet, in the articles "Ventriculus" and "Pantophagi," has exceeded all other authors for the vast number of cases he has amassed. In our own Philosophical Transactions, Lowthorpe's Abridgment, vol. vi. p. 192, or in the modern one by Drs. Hutton, Shaw, and Pearson, vol. iv. p. 66, an instance is given where the stomach of a horse was wounded and sewed up, and a similar instance in the human species; both recovered. More recently, sutures have been applied to its wounds in Holland and France, as may be seen in the "Annales de Litterature," &c. by Kluyskens, vol. ii. and in the "Traumatologia" of Schlichting; and it has been again successfully done, very lately, on the Continent by the French army surgeons.* Not unfrequently, a wound of the stomach has become fistulous, and remained open. Richerand gives a very curious case of this kind, where the opening remained for nine years; Etmuller, in the 5th vol. of Haller's "Dissertations Chirurgicæ," gives an instance where it remained open for ten years; and Wenker, in the same volume, relates a case where a wound of the stomach continued open for the long space of twenty-seven years.

Severe blows upon the stomach by spent balls, shells, &c. often produce as certain death as similar injuries of the head; these cases are often supposed to afford proofs of the fatal effects of the wind of balls.

* See Bulletin de la Faculte, vol. v. p. 386, for a case where the suture was used by Percy. Purmannus often stitched the stomach, in his practice with the army. Chirurgia Curiosa, p. 118.

Of wounds of the spleen I have seen a few; some of the slighter recovered, the deep invariably proved fatal. Experiments on the brute creation have given rise to some speculations on these wounds; but without incurring the charge of hardened scepticism, we may be permitted to doubt if the result of injuries, whether accidental or deliberate, on the lower animals, can be held as perfect illustrations of similar inflictions on the human body, although there may exist a very strong coincidence. Dionis, a very sagacious French author, whose work is well known in this country, has made a striking observation on this point, as applicable to the spleen. "About thirty years ago," says he, "a certain sect of surgeons sprung up, who took great credit to themselves for performing the extirpation of the spleen; they looked upon this part as useless, and even hurtful, perhaps because they did not know its functions. They supported their theory by an analogous operation on dogs, and because animals did not die upon the spot, they extolled the advantages it would be of to the human species; but all the animals subjected to it died shortly after, and no human being was found to submit to the proposal." It would appear, from Haller and others, that the brutes in many instances became more fat and salacious; and there is a recent instance on record, in which the spleen has been successfully removed from man by Mr. O'Brien, a naval surgeon, (Medico-Chirurgical Journal, 1816, vol. i.) where it had protruded at an incised wound. This is certainly a more favourable case than if that organ had been injured "*in situ*," where the blood from its numerous vessels might have been extravasated into the abdominal cavity,—a circumstance which seems to be the principal cause of danger. Dr. Home, in his "Medical Facts and Experiments," gives a similar case; and another is recorded in Duncan's Medical Commentaries, vol. ii. p. 351.

In some cases of wounds of the fixed viscera of the abdomen, particularly the spleen and liver, a critical hemorrhage from the wound, or a spontaneous diarrhoea, have relieved all the urgent symptoms, after copious purging and venesection had been employed before without effect.

Blows upon the region of the spleen have frequently given occasion to fatal extravasations of blood, and sometimes this organ has been ruptured by blows inflicted at more distant points. The following is a case of this kind, in which the dissection was performed at a very short period after death:

CASE LXXVI.

Rupture of the Spleen from a Blow on the Stomach.

“At a quarter before 10 o’clock on the morning of the 20th of February, 1820, I was suddenly called upon to see private J. B. 4th veteran battalion, but on my reaching his room he was dead. Assistant-surgeon O’Donel, whom I found with the deceased, informed me he had seen him about five minutes previous to my coming, and that, in consequence of the alarming state in which he found him, he had sent for me. When Mr. O’Donel saw the deceased, he was unable to speak, his countenance of a deadly paleness, his lips livid, his pulse not perceptible, —in fact dying. Upon inquiry, I learned that the deceased had been fighting with another soldier, by whom he had been knocked down, and that, while in the act of rising, with the assistance of another man, he received a violent blow on the stomach, which brought him a second time to the ground; that, upon being placed on his feet, he fell, as if he had fainted, against the range in which the cooking-pots are set. He was immediately assisted to his room, being unable to walk without support, and a non-commissioned officer instantly sent for a surgeon, so that five minutes had not elapsed from the infliction of the injury until he was seen by my assistant, who opened the median basilic vein, and endeavoured to give him some ether, but to no effect. At two o’clock, P. M., I examined the body. Upon opening the parieties of the abdomen, I was surprised by the escape of an immense quantity of dark-coloured fluid blood, to so great an extent, as to induce me at first to think the cava was ruptured. Having laid open the abdomen perfectly, I carefully removed with sponges the remainder of the effused blood, and, from the quantity collected I was enabled to form some estimate of the extent of the hemorrhage, which could not be less than between six and seven pounds. My attention was first directed to the large veins, which I found uninjured; the liver sound and healthy, as also the stomach, but quite full of liquid food; it happening just after breakfast; the intestines were healthy, and nothing worthy of remark appeared, but that the diameter of the sigmoid flexure of the colon was smaller than natural. Upon raising the great curvature of the stomach, I discovered a considerable collection of coagula and fluid blood surrounding the spleen, upon the removal of which I was enabled to ascertain the source of so fatal a hemorrhage.

“I carefully passed ligatures round the cardiac and pyloric orifices of the stomach, and then removed it with the spleen at-

tached. Upon examination, I found the latter ruptured from its lower to its upper margin, to the extent of four inches; the rupture passing under the duplicature of the peritoneum, connecting the spleen with the stomach, close by the entrance of the splenic artery, the large vein accompanying which was ruptured. The spleen was perfectly healthy, not in the least enlarged, nor any apparent tendency to disease; it was firmer in its structure than is generally found. The contents of the thorax were in the natural state, the coronary veins distended with blood. So completely were the other vessels emptied of their contents, that, on opening the superior cava, eight ounces of blood were not effused. Rupture of the spleen is a rare occurrence, unless when much diseased, and a great degree of violence is offered. But this case is very peculiar when it is considered that the part upon which the blow was struck is so distant from the viscera injured, but particularly so, that the spleen was not in the least enlarged, nor any apparent tendency to disease existing. Had the stomach been empty, I think the blow would have been borne with impunity; or had the contents of the stomach been less fluid, I think it probable it would not have occurred." For this very accurate account I am indebted to Mr. Burns, surgeon of the 4th veterans.

Some interesting observations on wounds of the spleen are to be met with in Richter's *Bibliotheca*, B. 8, p. 533, and among the older authors, as in Fallopius *de Vulneribus*, chap. 87, and in Schenckius, lib. 3, Obs. 104. A special dissertation on them, by Pohl, is extant in Schlegel's *Collection*, vol. ii.

From severe blows or bruises upon the abdomen, very serious injuries are inflicted without the solution of external continuity, and even instant death is no unfrequent consequence. Dissection in some instances explains these cases, but in others we are left entirely in the dark, and until we can affix a more appropriate name, we may apply the term concussion to them, as we do to the unknown cause of death in injuries of the head. Nor is the analogy so loose as might at first sight be supposed; for, independent of the lesion of the organs contained in the two lower cavities, the spinal marrow may be affected in a way beyond the reach of our senses to discover. Some cases of the effect of pressure upon it from internal causes, and some of the experiments of Le Gallois in France, and Philip and Clift in England,* open a wide and interesting field for inquiry, which the difficulties attendant on examining the *Theca Vertebralis* ought not to deter us from pursuing. Where the powers of

* Le Gallois, *Experiences sur les Principes de la Vie*, 8vo. Paris, 1812. Clift, in the *Philosophical Transactions* for 1818, part i. p. 91. Philip, in the *Edinburgh Medical Journal* for January, 1815. Knox, in the *London Repository*, vol. vi. p. 275. Moulson, in the *Medico-Chirurgical Journal*, vol. iii.

life, therefore, are obviously sinking, stimulants, both general and local, as wine, ether, warm friction, blisters, &c. may be used, followed up, if active inflammation should show itself, by the depleting plan.

It is from the neighbourhood of the spinal marrow, and the great nerves proceeding from it, that all wounds of the bony pyramid derive their greatest interest; extensive injuries, or permanent lodgement of balls, give rise either to death, or to incurable paralysis. In a sergeant of the Enniskillen dragoons, wounded at Waterloo, a piece of the shaft of a Polish lance stuck fast between the spinous processes of the two last dorsal vertebræ, completely paralyzing him until it was removed. In some cases we have to wait for the slow operation of exfoliation, if the spinous process be injured. Sinuses also are very apt to form along the spine, and they often prove very troublesome; I would never trust to pressure in these cases, but make a free, though cautious, incision. These incisions are sometimes rendered very necessary by the lodgement of balls, pieces of cloth, &c. Immediate death does not follow on all wounds of the spinal marrow, although it may have been completely divided, nor, as we learn from an instance related by M. Boulet, in the Parisian Chirurgical Journal, vol. ii. English translation, are these cases always attended with paralysis; in this case a gunshot wound of the chest completely divided the spinal cord at the tenth dorsal vertebra; the man survived twenty-six hours; the functions of the urinary organs were uninjured, but he was incapable of discharging his feces,—he was in constant agitation, moving the pelvis and lower extremities continually.

Balls which pass along, or strike against the different bones of which the pelvis is composed, if discharged from a musket, rarely penetrate; dreadful penetrating wounds and fractures, however, arise from round and grape shot. I have never witnessed a recovery from an injury of this description; nor have I seen one, where the performance of any operation, much less the application of a trephine, as proposed by Boucher in the Memoirs of the French Academy for 1776, could have been of use. The picking away of splinters, or other sources of irritation, is all that I have ventured to do in the few cases that have come under my care, trusting the remainder to proper regimen and dressings, and to the sanative powers of nature. It sometimes happens that balls lodge in or near the bones of the pelvis, and sometimes they enter the cavity through the natural foramina, constituting wounds of a most dangerous tendency from the nerves, blood vessels, and important organs which they injure. In some cases where a musket ball has struck at point blank range, it has fairly penetrated the bone; these cases are also highly dangerous, but there are some rare exceptions, in

which neither immediate death nor paralysis take place. Mr. Hammick, surgeon of the royal naval hospital at Plymouth, was so kind as to show me a preparation made from a patient who had received a wound from a musket ball, which passed through the right side of the sacrum, about three inches above the point of the os coccygis, and penetrated obliquely upwards. The ball was *passed by stool* in about two months after the infliction of the injury. The unfortunate man survived for two years, when a discharge of feces coming on through the orifice in the bone, he died, exhausted by a complication of sufferings, but no paralytic affection ever appeared. A case, precisely similar to this, was seen by Dr. Thomson, in the military hospital at Berlin, under the care of Dr. Reich.

In a case of an officer of the commissariat, which occurred at Elvas, during the siege of Badajoz, a ball passed through the sacrum, nearly in the same line of direction as in Mr. Hammick's patient, and out over the symphysis pubis. Urine passed after the first few hours from the posterior wound, and almost immediately from that in front, but no feces ever appeared at either, until a few hours before the patient's death: the intestinal gases, however, escaped in great quantities, and the smell was overpowering; no loss of motion appeared until the third day, when he expired, labouring under symptoms of the most violent peritonitis. On examination of the body, all distinction of parts was so completely obliterated, that the exact course of the ball could not be ascertained.

Dr. Thomson lately met with a case where a musket ball had lodged in the ilium of a military officer, where it remained above two years, until violent inflammation having been excited by dancing, it was luckily discovered and extracted with considerable difficulty. A very large quantity of matter followed the extraction, and it was obvious that the ball had perforated the bone completely, and had been wedged into it, and confined the matter. The patient, who had been hectic, gradually recovered, and now enjoys perfect health. Bordenave, in his paper so often referred to, and Andouillé, in the same volume of the Memoirs of the Academy, furnish some very interesting cases of gunshot wounds of the pelvis and spinal column.

Wounds of a most distressing nature, but fortunately not very common, occur in the perinæum, and in the organs of generation. In the first class, the elastic gum catheter is of the utmost assistance to us. In the few cases which I have met with, a perfect cure was effected by its employment, together with that of small adhesive straps to bring the lips of the urethra together, and light easy dressings, particularly finely scraped dry lint, without the aid of any scarifications whatever; the latter application, with an occasional emollient poultice, has generally

brought the wounds of the genitals to a healthy state. In some instances, the scrotum has sloughed extensively, leaving the testis quite uncovered; in others, the testis has thrown out, with great rapidity, a fungous protrusion. In some of these fungous cases, I have seen the whole tribe of escharotics employed in vain, and the ultimatum of castration has been adopted. This is a remedy often unnecessary, for, by removing the fungous growth with the knife, and cautiously dissecting away the excrescence in slices, until we come to the sound structure, the parts frequently heal up with the usual dressings.

It will be obvious, in the perusal of the foregoing part of this work, how much I have trusted to DEFLETON; but I beg to remind my readers, that I have been describing the injuries of robust young soldiers, full of life and vigour, and fitted for all the purposes of active warfare; living principally in the field, enjoying few, if any, of the luxuries of domestic society, and, consequently, exempted from many of the diseases incident to the inhabitants of cities. A short absence from the army, has, however, been often attended with a remarkable change in their constitution; the men who were once in the hospitals in the rear, have almost constantly formed the great majority of their inhabitants afterwards. It may be said they were weakened by previous sickness,—to a certain extent I admit the fact; but the same cannot be said of the officers who, from duty or other causes remained in the dépôts, and preserved their health there. These men could not bear the privations of the field; they were subject to low typhoid febrile attacks; they could not bear evacuations, either in their diseases or their wounds, to any thing like the extent of those more actively employed. The difference of success was so notorious, that the dépôt officers were consigned to certain death when they joined the army, by their veteran brethren; but what military men deemed moral judgments, medical men accounted for upon physical principles.

The histories of unlooked for cures that have occasionally been effected in wounds of the various parts of the body, and that have from time to time been recorded, should render us cautious in pronouncing any injuries absolutely mortal, and should encourage us to persevere to the last in our efforts at relief. True it is, that those histories are more numerous in the earlier annals of our science, when miracles of surgery and miracles of medicine shed a mystic glare around their professors, and distinguished them amidst the “palpable obscure” of a superstitious age; but even in the present day, when the steady light of anatomy, of physiology, and all the collateral sciences, has illuminated the different branches of the healing art,—when the theorist and the speculator are neglected or ridiculed, and the fascinating mazes of fancy are abandoned for the more

arduous path of rigid inquiry and practical deduction, facts singular and inexplicable are daily offered to our notice. To rescue these facts from oblivion is the duty of every man; each reader or each witness may doubtless consider them with a bias perhaps unknown to himself, and involuntarily influenced by his own peculiar opinions, or by the particular point of view in which he sees them. In the foregoing pages I have, as far as I was capable, divested myself of every prejudice, and been the faithful narrator of what I have seen; I have neither indulged in the visions of theory nor the intricacies of criticism, nor have I strained or distorted facts to serve a particular purpose; and if I have contributed to fix one wavering mind, to illustrate one point of military surgery, or to advance in the smallest degree the interest of that branch of my profession to which my life is dedicated, I shall have obtained the full completion of my wishes.

I should next proceed to details in which the general practitioner is deeply interested, and in which I shall endeavour equally to divest myself of all prejudices and preconceived opinions; but I shall first throw into a miscellaneous chapter some observations which at present I can only consider as hints to my military readers, but upon which I may hereafter have more time to enlarge.

CHAPTER XX.

OF MISCELLANEOUS POINTS CONNECTED WITH MILITARY SURGERY.

ALTHOUGH some of the subjects of this chapter merit a much more detailed consideration than I have space to enter into, I could not omit them in a work professing to treat on Military Surgery, and the duties of the army surgeon. These subjects are, the examination of recruits, on their entrance into the service; the examination of military persons said to labour under various diseases, which have been assumed for the purposes of procuring a discharge from the service, or an increase of pension, or temporary exemption from military duty; and, lastly,

some few heads of inquiry on which the medical officer should find his reports, on the medical topography of the stations in which he may be quartered.

EXAMINATION OF RECRUITS.

In the standing orders of our army, as well as in those regulations issued from time to time for the guidance of officers connected with the recruiting department, some directions are given on this head; but little or nothing is to be found to guide the surgeon in dubious cases, much being left to his own discretion. This often occasions very striking differences of opinion between the examining officers, as to fitness of recruits or deserters for service; and as, by a recent regulation, the extraordinary expenses incurred for recruits, who are not ultimately found proper subjects for the army, are paid by the surgeon, he often finds that he is a considerable pecuniary sufferer, by his carelessness, his ignorance or his good nature. The subordinate officers and soldiers who are employed in this service often take advantage of him, and frequently present men a second time, whom he had previously rejected. The examining officer should therefore always be in possession of a register, in which should be inserted the name, age, and description of the recruits whom he examines, the date of their examination, and, if rejected, the cause of their unfitness.

The plan adopted for filling the ranks of the French army by conscription, during the revolutionary war, occasioned many attempts at evading the service, and induced the constituted authorities of that very ingenious people to form a set of regulations, which left few if any points on which the persons connected with this branch of the service could go astray. Indeed their "Code de la Conscription," 8vo. Paris, 1810, may, as far as the medical officer is concerned, be considered as a perfect model: I would strongly recommend a perusal of it to all medical officers; and I shall avail myself of such parts of it as are applicable to the British service, as I go along.*

It should be made a general rule, never to examine a recruit or deserter while he is in a state of intoxication; the examina-

* This book is rather difficult to be procured in this country: an abstract of it will be found in the Edinburgh Medical and Surgical Journal for April 1816, vol. vi. Mr. Marshall, Surgeon to the Forces, published in 1828, an 8vo. vol. entitled Hints to Young Medical Officers of the Army, on the Examination of Recruits, and respecting the Feigned Disabilities of Soldiers. He has annexed to this useful work the French and Prussian Codes for the Inspection of Recruits.

tion should always be made when these persons are naked; and that the surgeon may be assured that he has left no part of his duty unfinished or neglected, he should form a regular system in his own mind for his guidance, and should not trust to a desultory inspection. He should first examine the persons submitted to him generally "a capite ad calcem," as to the external parts of their body, and then more particularly as to their functions, several of which will have come under his view in his first examination.

In the first examination, the shape of the head should be ascertained; no man with a preternaturally large cranium, or who has the mark of extensive fracture with depression, or who has venereal, or other exostoses, can be considered as a healthy subject. *Tinea capitis* is a cause, which, without proceeding any farther, is sufficient for his rejection.

All diseases, or marks of former disease in the eye, or lacrymal passages, are a principal cause of rejection; the examination on this point should be particularly minute, and both the upper and lower eyelids should be gently turned out over a probe, to ascertain the existing state of the membrane lining them. If it present marks of existing inflammation or granulation, or the appearances of former cicatrices, the person is ineligible. Polypus of the nose, or caries, or ozena, or extensive fractures, or distortions, are causes of rejection. In the mouth, an extensive deficiency of teeth, caries of the bones, or foul ulcerations of the gums, and all chronic diseases of the salivary passages and glands, renders the person ineligible. In the neck, all serofulous tumours, enlargement of the vessels, or rigidity, or distortion of the muscles and joints, are causes of rejection. All malconformations in the thorax, whether in its fore or back parts, are, without proceeding farther, causes of rejection, as are also all marks of punishment, or extensive cicatrices. All preternatural tumefactions of the abdomen, or distortions of the lumbar vertebræ, all herniary protrusions, fistulous affections of the rectum, or extensive hemorrhoidal or other excrencences, render the subject unfit for service. All diseases of the testicle, or spermatic cord, all tendency to a varicose state of the vessels in these parts, and all herniary tumours, are causes for rejection without proceeding farther. All distortions of the legs, thighs, or arms, exostoses, nodes, caries, extensive fractures, open ulcers, or extensive cicatrices, especially on the shin, and adhering to the bone, stiffness, or contractions or dislocations of any of the muscles, tendons, or joints, varicose vessels, especially in the ham, or its neighbourhood, wasting of the limbs, loss or contraction of the fingers, loss of the great toe, caries of the bones of the toes, all foul ulcerations between them, or distortions, rendering the pressure of a shoe or boot painful, or walk-

ing difficult, are causes of rejection. The loss of one toe, if it have proceeded from accident, is not perhaps a cause of actual rejection, though it renders the person an object for strict consideration. All cutaneous affections of an inveterate character are a cause for rejection; simple itch is so frequent among the lower orders, that it forms an exception.

This first and more general examination will have enabled the surgeon to ascertain several important points. He should now re-examine the person submitted to him more particularly as to their various functions. *Their Intellect.*—Idiots should at once be rejected. At the commencement of a war, I have known many instances of such persons being brought forward for examination. *Their Vision: their Hearing: their Speech, their Smell.*—All affections of the sight, deafness, dumbness, and stammering, are causes for rejection. In examining for veteran battalions, the loss of one eye is not considered a cause of rejection, but on the late formation of these battalions, the examining officers were furnished with printed instructions as to the specific causes for rejection. On all occasions, these specific instructions are a great assistance to the surgeon, and should be most rigidly attended to. Loss, or great distortion of the nose, impeding the sense of smell, is a cause of rejection, as well as the other diseases mentioned above. The state of their *Respiration* should be specially examined into; short frequent dry cough, asthma, and all symptoms denoting a phthisical tendency, form a cause for instant rejection. Extremely fetid breath is also a cause for rejection. The state of their *Circulation* should be particularly examined, and the existence of all palpitations, or other affections of the heart, aneurismal and varicose tumours, should be strictly inquired into; they form a cause for absolute rejection. The loss of the penis, or of both testicles, is stated as a cause of rejection in the French code. Such a case never came before me, but if it did, I should consider it a fair cause for rejection. Diseases of the urinary passages, and stone in the bladder, are a sufficient cause for rejection.

An aspect betokening habitual ill health, without any specific disease being present, is a sufficient cause for rejection. If the recruit ever has had epilepsy, however healthy he may appear, he is at once to be rejected by the standing orders of the army.

By adopting this systematic mode of examination, and by making the person to be examined walk, run, or leap, move and extend his joints and limbs in various direction, cough with his arms extended over his head, and with his head and chest thrown back, it will be very rarely, indeed, that any serious cause for rejection can escape the examining surgeon.

HEADS OF INQUIRY ON MEDICAL TOPOGRAPHY.

The study of medical topography is one of considerable importance to medical men of whatever class; but the habit of arranging his ideas on this subject, so as in the shortest possible time to acquire the most valuable information concerning the situations in which he may be stationed, (as far as the health of the troops is concerned, is an essential object to the military practitioner. Diseases, the characters of which are supposed to be the most unalterably fixed, are greatly modified by locality. The plague itself, the most violent and the most rapid of diseases, acknowledges this influence. Thus we find, that, in the expedition to Egypt, the cases of plague in the 61st and 88th regiments, whose hospitals were crowded, were, from the commencement, attended with typhoid, or low symptoms. The cases from the Bengal volunteers, and other corps encamped near marshy grounds, were all of the intermittent or remittent type. The cases which occurred in the cold rainy months of December and January had much of the inflammatory diathesis; and every case admitted into hospital at one quarter, Rahamanie, had the symptoms of pneumonia. See "Medical Sketches of the Expedition to Egypt from India," by Sir James M'Grigor.

The following heads may serve as useful memoranda to the medical officer whereon to found his inquiries; others will naturally be suggested by his own ingenuity, and the peculiarities of the district in which he may be stationed. These heads are divided into three classes, as they refer to the station of the troops, to the barracks, and to the hospitals, and are as follows:

CLASS I.—*The Station.*—1. Its geographical position—size—population—distance from the sea—rivers—marshes—bogs—and its height above their level—its drainage and state of its canals.

2. Nature of the soil—its mineral and vegetable productions—nature of its waters—their medicinal powers and chemical contents.

3. Police—morals—food—employment—cleanliness—and general health of its inhabitants.

4. General direction of the prevailing winds, and whether they blow over bogs, marshes, the sea, &c.—mean standard of the thermometer, barometer, hygrometer, and mean quantity of rain.

5. The diseases of the inhabitants, and whether they appear to be influenced by the situation—the contagious diseases which

most prevail in the town or district—in its civil hospitals—prisons—poor-houses, or manufactories, and their nature—the peculiar diseases among the inhabitants, or among the troops quartered in the town.

6. The ordinary period of duration of life among the inhabitants, and the remarkable instances of old age, or of mortality—the relative state of health of the last twelve months to that of former years—if possible this information should be extended to several preceding years.

7. The most unhealthful season, according to the observation of residents and physicians who have written on the subject—the comparative mortality according to the registers of births, burials, &c., of the country and of the town.

8. The peculiar modes of cure adopted by the inhabitants or their resident medical men, and an account of any particular remedies.

CLASS II.—*The Barracks.*—1. Their situation—the date of their erection—their form—whether built in a square, or in parallel lines, or in detached houses, or any other particular manner, and whether of wood, brick, or stone.

2. The nature of the soil on which they are built, and of that immediately around them—their state with regard to damp, cold, exposure to particular winds, and their general aspect.

3. Their general plan—the number of stories—the number of rooms in each story—the state of the cellars, and whether inhabited or not—the number of men they are calculated for in war, and the number in peace—whether they consist of one, or of many distinct buildings.

4. The size of the rooms in feet—as to their height, length, and breadth—the number of windows in each—ditto of doors—ditto of fire-places.

5. The state of ventilation—whether the upper sashes let down, and the lower lift up—whether any reach down to the floor, or up to the ceiling—whether there are holes or ventilators over the doors, or in the walls or ceilings—whether the fire-places vent well, and are so placed as to sufficiently warm the rooms, and to obviate the danger of the men sitting around them being exposed to rude currents of air from the doors or windows.

6. Whether the bedsteads are single or double—of one or two tiers of sleeping places—and whether their bottoms lift in and out, so as to admit of cleaning under them—whether the bedding is sufficient.

7. Calculating the number of men in each room, and its size, to ascertain how many cubic feet each occupant has allowed him on the war, and how many on the peace, establishment—wh-

ther the size of the bedsteads, or of presses or divisions in the rooms, materially deduct from the volume of air, or from its free circulation—whether there are any recesses or projections which favour the accumulation of filth, or conceal it when accumulated.

8. Whether the passages are well constructed for ventilation, with cross windows, or with gratings admitting a passage of air perpendicularly through the different stories from the ground to the roof.

9. Whether the kitchens, wash-houses, &c., are good, and separated from the barracks.

10. Whether the barracks and the yard are well drained, and the latter ample in size.

11. Whether there is a sufficient supply of water, and if furnished by rivers, pumps, springs or cisterns.

12. Whether the privies are detached, ample, clean, well drained, and with free access of air and light, and whether they are placed on that front, which from the usual course of the winds is most frequently to be leeward. Whether the privies or common sewers emit any unpleasant exhalations in any particular state of the wind or of the weather.

13. Whether any particular diseases have prevailed in the barracks, and whether they have been general or confined to particular rooms or wings.

14. Whether the places of confinement are dry, wholesome, and airy, and whether disease has ever been traced from them.

CLASS III.—*The Hospital.*—1. The same questions as in Class II. to be answered as far as they are applicable to the hospital.

2. Whether the store-rooms are sufficient for the provisions, the clean and dirty linen, the men's packs, &c. Whether there is a sufficient surgery, dead-house, wash-house, &c.

3. The distance of the hospital from the barracks, and whether it is of easy access. Whether there is a separate airing ground for convalescents.

4. Whether typhus or hospital gangrene have ever made their appearance,—or whether several patients have ever laboured under any particular disease at the same time, which could be fairly attributed to the locality of the hospital.

If these points of inquiry are duly attended to, a great mass of useful information may be elicited in a very short time.

CHAPTER XXI.

OF FEIGNED DISEASES.

THIS is, in many instances, a subject of extreme delicacy and importance, and on the just decision of the surgeon the character of an individual, and the benefit of the service, are materially interested. Upon the whole, however, malingeringers, as they are technically called, are not now so frequently met with as formerly.

In forming a judgment of these people, the medical officer must be greatly influenced in his decision by his knowledge of their previous character, habits, constitution, and former complaints, and by the ostensible reasons which they may have for feigning either for temporary or permanent purposes. The men of bad characters, who are to be found in all corps, especially at the beginning of a war, will be incessant in their attempts, particularly on young surgeons: frequent examinations, made apparently without having any suspicions, will often, by the contradictory replies, enable us to elicit the truth, and they should be made in private, as the number of spectators always increases the obstinacy of the impostor.

There are some diseases, the symptoms of which are so obvious to a well-informed medical man who watches them closely, and at times when he is not expected, that no artifice of those who pretend to labour under them can deceive him; these diseases are principally of the acute class. One caution I have already given at page 198, upon the subject of distinguishing between intoxication and those severe affections of the nervous system which so frequently precede fever. It has been said, but I know not whether on good authority, that a severe paroxysm of fever may be excited and kept up by the introduction of a clove of garlic into the rectum. Profligates have, to my own knowledge; boasted that they have often received indulgences from the medical officers in consequence of a supposed febrile attack, by presenting themselves after a night's debauch, which they have purposely protracted, to aid the deception. Emetics also have been taken with the same view, or the face has been exposed to the fumes of sulphur, and Fodere states, that paleness has been imitated by smoking cumin, (*Cuminum cyminum.*) I have seen some old soldiers, profoundly versed in the history of a paroxysm of intermittent, and very skilful in imitating the rigors, but their detection has never been difficult.

Mr. Hutchison mentions an instance where a French prisoner swallowed tobacco, and covered his tongue with soap to produce fever; the tobacco occasioned great rapidity of pulse, but the matters ejected from the stomach were so strongly impregnated with the smell, that the discovery was easily made.

Of the diseases of the chronic class, which are often assumed, one general remark should be attended to, viz., that it is very rarely a disease of this description exists for any length of time, without obviously injuring the patient's general health, or his external appearance. Ulcers, chronic rheumatism, incontinence of urine, epilepsy, ophthalmia, pectoral complaints, and affections of the liver and intestinal canal, are those most frequently assumed.

Ulcers were formerly extremely prevalent in the army, and were often produced by various acrid applications, pressure, &c.; but by the adoption of Mr. Baynton's practice, they are now rendered much more manageable: where the ulcer is supposed to be excited by unfair means, surgeons are now in the habit of sealing the dressings, and so effectually preventing any improper tampering with them without immediate discovery. I had some time ago a case in a recruit, reported to be "pompholyx diutinus," and resembling that species of bullæ in a very remarkable degree. After several weeks, Dr. Bartlet, of the 88th regiment, into whose charge the man was at last transferred, detected a shining particle of the powder of cantharides adhering to an unctuous dressing, which he had purposely applied loosely to the limb, in order that the patient might not be prevented from managing his case in his own way.

Pins are occasionally stuck through the ordinary dressings to imitate ulcers; a box will therefore be found even better than the sealed roller.

With regard to chronic rheumatism, if there is not an evident wasting of the limb, said to be affected, I should not conceive it a sufficient cause for excusing from duty, or invaliding any class of military men. Severe rheumatic affections of the back occasionally produce distortions from disease of the vertebræ, or their ligaments, and are often a cause for invaliding. The real rheumatic affections are all aggravated by damp; the imposter complains at all times.

Incontinence of urine is frequently affected by worthless soldiers, but is almost always detected by giving them a full dose of opium at night without their knowledge, and introducing the catheter during their sleep. Or, by taking them by surprise during the day, and introducing the same instrument, when it will be found that the urine has not drained off guttatum as it was secreted, but that the bladder possesses the power of retention. If the bed-clothes are not found wet after a full dose of

opium, during the operation of which the patient is suddenly awoke, we may also be satisfied that there is no incontinence, without taking the trouble of introducing the catheter.

If a soldier can discharge his urine in a full stream, and in the usual quantity, which the less hardened impostors may be desired to attempt before the examining officer, no doubt can be left as to the non-existence of disease. Foderé says, that if the penis is secured by a ligature, it swells considerably in the real incontinence, in consequence of the urine running into the urethra; but this does not happen in the feigned. Dr. Bancroft, in his *Essay on Yellow Fever*, p. 15, has well observed, that in most cases of injury of the spine, or disease of the bladder, in which that viscus loses the power of contraction, it also soon loses its governing powers, and the urine is voided in a putrescent state, like that voided in severe cases of fever,—from this fact a diagnosis between real and feigned enuresis may be drawn.

However high-coloured the urine may be, if it does not contain blood, it does not give a clear red stain to a bit of linen dipt into it, (see Howship on *Diseases of the Urinary Organs*, p. 12.) We should see the patient make water, and then instantly dip a rag into it, and secure it from any after addition of blood. If blood be really evacuated in a fluid state, it soon forms a coagulum on the linen cooling, a fact which may assist us in forming our judgment.

Bloody urine is sometimes imitated by pouring real blood, or colouring matter into the chamber pots; and in India; the fruit of the prickly pear, or Indian fig, (*cactus opuntia*,) is often eaten, and gives to the urine a bloody appearance. Large companies of men have been simultaneously affected in this way. Ellicot, in the *Journal of his "Travels for determining the Boundary of the United States,"* 4to. informs us that his people eat very plentifully of this substance, at an island of the Mississippi, (*Kayo-uni*), "and were not a little surprised the next morning, on finding their urine appear as if it had been highly tinged with cochineal." No inconvenience resulted from it. It would appear that the juice of this plant may be analyzed into a crimson dye by other processes besides that of the cochineal insect. Beet root also has the same effect.

All pretended calculous concretions can be immediately detected by sawing them through, and marking the absence of a lamellated appearance; or by applying to them the chemical tests pointed out by Dr. Marci, in his excellent work on *Urinary Calculi*. In general, we shall be enabled to recognise in these substances the common stones and sand of the highways or fields in the impostors' neighbourhood.

Worms have been imitated by throwing vermicelli into the

vessel which contains the urine; this clumsy deception is easily recognised; but the appearance of worms in the urine is occasionally given by filaments of coagulable lymph, which have really passed, and which probably have been formed in the ureter: here disease exists.

Strictures are often feigned, especially by idle officers: the cautious use of the catheter will soon discover their existence.

A trick, very common formerly among vagrants, but which is now of more rare occurrence, and which I should scarcely have mentioned here, were it not that a case of it has recently come to my knowledge, is the puncturing the scrotum, and by means of a straw or quill, distending it with air to an enormous size; the detection of this deception is not so easy as may be imagined, but the suddenness of the tumefaction, and the general character of the subject, together with a close examination to discover the orifice made in the integuments, will lead to the detection. Emphysematous tumours in other parts of the body may be produced in the same manner.

Some persons have the power of drawing up the testicles into the groin, so as to resemble hernia: of this Mr. Hutchinson gives an instance.

Injuries to the loins are also often feigned by men who have some power over the vertebræ, and can for a time throw themselves into a state of distortion.

Some have the power of dislocating even the femur. (See Sir A. Cooper, Preface, 3d edition, p. 7.) Others possess the power of dislocating the patella at will, (see same book, p. 9,) this occurred in a female dancer. In the 7th garrison battalion I met a slight of hand man who could throw his wrist, thumb, and fingers into a state of most singular distortion.

Contracted joints, see Haddock's case, Mr. Marshall's paper. If the arm is kept stretched out, as it occasionally is, we examine the biceps; if it is plump and vigorous we doubt the reality of the case; if the biceps is cut through by a sabre, or much injured, then the biceps keeps the arm constantly extended.

Epilepsy so rarely appears for the first time after the age of puberty, that its reality is to be suspected whenever it comes on, without obvious cause, in an old soldier. Those who feign this disease select conspicuous situations, and rarely present the appearance of bruises or injuries of the tongue. In the real disease, the muscular contractions are *preternaturally* strong and protracted, and they are simultaneous, not exerted one after the other; and the patient, after they are over, falls into a profound sleep. It has also been observed, that in the real epilepsy, if the hands are forced open they remain so, while in imposters they are immediately clenched, and the nails are livid in the former, but retain their natural colour in the latter. But it is

from the eye that we are best enabled to form our judgment; in the imposter it is moveable, and the iris is sensible to the impressions of light. In the real epilepsy the eye is fixed, and the iris does not contract on the application of light. The sense of hearing also is lost in the real epileptic; the proposal of a cautery will often effect a very rapid cure on the imposter, who is perfectly sensible to sound as well as to pain. M. Vaidy states in the article "Hygiene Militaire," in the "Dictionnaire des Sciences Medicales," that he had recently detected a recruit who was reputed to be afflicted with epilepsy, by assuring him that the real disease attacked only in the morning, while the feigned appeared after mid-day. The next day the imposter arranged his fits according to this information. In mendicants, who assume this disease for the purpose of exciting charity, a small morsel of soap is moved about in the mouth to create the appearance of froth; a similar device has, I believe, been occasionally detected among soldiers.

Mania is sometimes feigned, and is an imposition of very difficult detection. The feigned maniac never willingly looks his examinator in the face, and if his eye can be fixed, the changes on his countenance on being accused are indicative of his real state. I have seen an instance where a person, feigning madness, confessed that he could not support the inquiring glance of the physician who examined him. Real maniacs often resist the want of sleep and the power of emetics and of opium very remarkably.* This disease is very rarely feigned by military persons; we occasionally find, however, that some of their diseases derive their character from a certain state of mental hallucination; this, in my opinion, was the case in an instance which made some noise in the south-western parts of England a few years ago. It occurred in a soldier who, as a punishment for poaching, had been sent to a corps employed on the coast of Africa; and was afterwards placed under my superintendence at Hilsea hospital, in the neighbourhood of which place he was known by the appellation of the "Sleeping Man." There can be no doubt, however, that grief and terror had also a share in the production of his disease. As no regular detail of his previous history could be obtained on his being received at Hilsea, the following experiments were arranged and carried into execution, principally under the management of Dr. Knox; and my report on the subject to the director general of hospital gives the following account:

* A singular case of simulated mania is given by Professor Monteggia, in the Medical Memoirs of Dr. Giannini, for 1800, which contains some valuable hints respecting the action of opium in real and feigned madness. See also Foderé "Medecine Legale." Article "des Maladies Feintes."

CASE LXXVII.

Of Somnolency combined with Mental Hallucination.

The state of the patient is as follows: He is, or pretends to be, in a state of somnolency, incapable consequently of any muscular motion, and lays constantly in bed, retaining that posture in which his limbs and body may chance to be thrown, unless the position be an awkward one, and not easily persisted in. He affects to be constantly asleep, though the difference between this and real sleep may be observed on the individual himself every evening. His great aim seems to be this, viz. to be considered unconscious of the external world; and with that view he holds no converse with it in any manner. How far this is actually the case, may be gathered from the following experiments:

1st, The upper eye-lid was raised, and the pupil observed to be perfectly susceptible of the stimulus of light. The hand was made to approach the eye suddenly, and the orbicularis palpebrarum contracted with a rapidity clearly indicative of a fear of injury to the organ. Occasionally he disregards this. The experiment proves him to be conscious of those impressions which the brain receives through the medium of the eye.

2^d, The pulse is generally that of a healthy person; it becomes very frequent on the approach of the gentlemen who conduct the experiments, and became almost insensible to the touch when the proposal was first made to submit him to electricity; a decided proof that the organ of hearing performed its functions; that the brain was conscious of a second set of impressions; and that the vital organs, such as the heart, sympathized with it.

3^d, The sense of taste and smell are excitable by the usual stimulants, since he takes his food (milk diet, occasionally half diet or low, with extra allowances) like one in perfect health, and has a great dislike to any thing bitter; a piece of aloes was put into his mouth, which he very soon after vomited. He sucks and partly chews his food, but never employs his masticatory organs on any thing indigestible which may happen to be put into his mouth, as a piece of iron or brass, seeming to be perfectly aware that such things are neither easily chewed nor digested.

4th, He pretends to be perfectly incapable of using his muscles. On raising the fore arm, he retains it in that position for some time, but not longer than a man of ordinary strength is capable of doing. The first day also he kept his leg elevated, when

elevated by another person, but since that time he allows the limb to fall down immediately, apparently finding the position inconvenient and painful. All the muscles of the body are excitable by electricity.

5th, The sense of touch is that to which he seemingly pays most attention, next to the general muscular debility which he affects. The skin, however, though evidently much against his inclination, shows abundant marks of sensibility on the approach of a hot wire,* from which he uniformly and involuntarily shrinks; it is strongly affected by cold applied in the form of a shower bath, during the use of which the muscles of his face act involuntarily, expressive of strong dislike. The dashing unexpectedly any liquid in his face, produces in his countenance every mark of surprise and fear; the success of this experiment was particularly striking, and was remarked by all present.

The subject of these remarks is of a stout muscular form of body, of a rather dark complexion, apparently thirty years of age, and evidently in a state of perfect health. All his functions are performed with the utmost regularity, and every organ of his body is readily acted upon by its accustomed stimulus. Even the brain itself, on which no direct experiments can be made, seems in perfect possession of all its powers, the only faculty which, for obvious reasons, could not be made the subject of experiment, being that of volition.

June 6th.—Has been reported by the orderly appointed to attend him, to have moved himself during the night. The electrical machine was again employed, and a great many severe shocks passed through different parts of his body. Common hartshorn was, as on a former occasion, injected into the nostrils. The employment of these stimulants either did not affect him so much as on former trials, or he endured them with more fortitude. Finally, the shower-bath was thrice used, and with the same effects as yesterday. He appears, however, to be getting habituated to this also: his head has been ordered to be shaved and blistered.

7th.—Yesterday afternoon, whilst the orderlies were employed in the ward in which the patient is placed, one of them stole softly to his bedside, and suddenly shouted aloud in his ear; the experiment had the desired effect, he leaped up immediately and stared around. On recovering from his surprise, he lay very quietly down, and resumed his former appearance of being asleep.

13th.—Since last report, he has continued precisely in the same state; his complexion is clearer, and he appears, if possible, in still better health than when brought into hospital. Small

* The skin was never touched in the course of these experiments.

doses of calomel and antimonial powder have been given him, which act readily on the bowels. Yesterday, in presence of a number of military medical officers, several experiments were repeated with the greatest success.

1st, The upper eye-lid being raised, a piece of rolled paper was pushed directly towards the cornea; this constantly produced contraction of the muscle, in order to save the organ from external injury. The experiment succeeded in both eyes.

2nd, The upper eye-lids were raised, and pressure made on the forehead, immediately above the nose; the eyes remained open. The pressure was removed, and a common penknife was laid across the forehead in such a position as in no way to influence the action of the orbicularis palpebrarum muscle; he still kept his eyes open; the penknife was removed, and he shut them immediately.

There can be but one opinion on this experiment, and one conclusion drawn from it, viz., that he imagined his eyes ought to be kept open by pressure on the forehead; and, not aware that the pressure had been removed when the knife was laid across the forehead, he still retained his eyes open until this was removed. The shutting the eyes is with him an act entirely voluntary. It is now proposed to have recourse to nauseating doses of tartar emetic.

This report was dated in June, 1816. On the 18th of that month, he was visited by the garrison chaplain, by whose exhortations he was evidently much affected, that gentleman having held out every hope of pardon to him, if he did not obstinately persist in counterfeiting appearances that were not natural to him. In two days after this, he sat up, keeping his eyes open, and occasionally moving his hands; this amendment was prefaced by some convulsive movements, which were reported to me as having been "so evidently an imitation, as to be obvious to all present;" this day he was allowed some wine. On the 21st he employed his masticatory organs readily, and seemed more improved than on the preceding day; he slept naturally for several hours after having sat up in his bed all day. With a little assistance, he carried a glass of wine to his mouth, which he readily swallowed, and apparently with relief. His progressive improvement was evidently graduated by his own will, and considerably influenced by fear and hope. He put out his tongue for the first time this day, on being directed so to do.

The crowds of the populace, and even of the more respectable inhabitants of the country who came to see this man, were very great; and no doubt a considerable revenue might have been drawn from showing him as a phenomenon, an intention which I understand was at one time entertained by his friends. The

most extravagant tales, were circulated about him: one was that the surgeons of Hilsea hospital had cut off his head; a very respectable dressed farmer requested me to admit him to the hospital, to enable him to verify this extraordinary fact himself; and he left us very much surprised, and apparently disappointed, at finding our patient in possession of every part of his body. The nuisance, however, at length became so great, and the other patients in hospital were so incessantly disturbed, that I applied to have the man transferred to London. On the 9th July he was embarked for York hospital; his pulse regular, and about 90, his skin moist, his countenance natural, his bowels regular; in short, his health in the best state, except a slight inflammation of his eyes. During the passage he took his food apparently with appetite; all the functions of his body were perfectly natural; the motion of the ship occasioned no degree of nausea; but he manifested much uneasiness in the recumbent posture, frequently turning his body, stretching his limbs, and endeavouring to elevate himself into the sitting posture. During the course of the voyage he succeeded in sitting up without any assistance, and appeared sensible to cutaneous titillation, being observed to have scratched various parts of the body. Towards the conclusion of the voyage he manifested strong symptoms of mental distress. He was admitted into York hospital on the 17th of July. He was then apparently in a state of stupour; he lay without motion in bed; his eyes remained, during the day, immovably open, unless when roughly touched; he appeared to have lost the senses of sight and hearing, and he never attempted to speak; he ate his allowance of provisions, but required to be fed by an attendant; his general health did not appear materially affected; his bowels were inclined to constipation; his skin cool, and tongue clean, his pulse varied from 70 to 100 in a minute.

As his case appeared to the able and judicious physician, Dr. James Forbes, who superintended the establishment at York hospital, to be satisfactorily accounted for, by supposing it to be the effects of extreme grief and fear upon the nervous system, he was treated in the most soothing manner; excepting a brisk cathartic every second morning, nothing else was attempted in the shape of medicine, but all was trusted to management. By this mode of treatment he gradually improved, and towards the end of July was able to get out of bed unassisted, and dress himself; he walked about the garden daily, recovered his hearing, and at length answered questions put to him in a low whisper; and ultimately he was discharged from the hospital, and, I believe, from the service.

Whatever doubts may arise as to the existence of a systematic attempt at simulation, in this and other cases, that humane prin-

ciple should never be forgotten, which leads us to consider, that the escape of many guilty is a much less evil than the unjust punishment of an innocent individual.

Daily experience shows us, that maniacs, or persons labouring under certain states of mental hallucination, are perfectly capable of supporting any appearances which require the combined efforts of cunning and obstinacy. To this disposition are to be referred, in a great measure, the wonderful cases so often related of the discharge of flints or basalt from the urinary organs, or from the vagina of women, which have always been placed there, and often picked up from the high roads in the neighbourhoods; or the periodical discharges of membranous matters, which on examination have turned out to be long portions of the intestinal canal of the smaller animals, &c. Paré relates an instance where a polypus of the gut was feigned in this way; but in his case, the villany of the impostor was unmixed with any mental derangement.

Ophthalmia is often artificially excited by the application of various stimulant remedies; sometimes the effects of these remedies are very easily detected. Thus lime excites a deep slough, caustic the same; there are several others, however, which are not so easily discovered. Spirits of turpentine I have found to be an application much in use, and not easily discovered: tobacco smoke blown into the eyes is also of the same nature. Washing in the tubs distributed in the barrack room is a filthy practice, by which there is occasion to suppose Ophthalmia has been kept up, and even in its gonorrhœal form; sometimes with design. In a corps some years since under my superintendence, which was in part recruited by convicts, and which was ordered to the West Indies, the surgeon was led in one case to suspect the application of some acrid substance to the eye, by the depth and the defined edges of the ulceration. On minute examination of the person of the patient, a paper of corrosive sublimate was found in his possession, with some manuscript directions for its use, in which it was recommended to put a minute portion of this substance into the eye on going to bed, to repeat it every third night, and to be cautious not to put too much, lest the eye should be destroyed. There was also annexed to this prescription a form of receipt for removing the artificial disease thus produced; it consisted of a decoction of parsnips and clover, with which the eye was to be fomented; and the leaves of the clover, softened by boiling, were to be applied to the part, and continued to it during the night. On no other individual of the corps could any deleterious substance be discovered; but it was not a little remarkable, that all the leeches which were applied to him, as well as to other suspected persons, died almost immediately,

giving every reasonable ground for the supposition that they were poisoned by the action of the mercurial solution.

If in any suspected corps we find that the right eye is universally affected, it gives a reasonable ground to suppose, that the deleterious substance has been put in preference into that eye, from design, or perhaps from the facilities which the impostor derives from his right hand; a left-handed man will, for the same reason, inflict the injury on the left eye.*

There are several affections of the eyes which are not discoverable at first sight, and for an account of which we must occasionally trust to the patient himself. We can, from the form of the globe, and from the mode in which the patient views objects, often determine on the existence of near-sightedness; in some cases, it exists without any very obvious malconformation of the eye; in others, it is altogether affected. The French employed a simple and ingenious mode of distinguishing the feigned myopes who endeavoured to escape the conscription laws. They placed spectacles of various powers upon the persons to be examined, and suddenly bringing before their eyes a printed paper the subject of which they were not acquainted with, the facility with which the person under trial was able to read, pointed out with considerable accuracy the actual state and degree in the deficiency of vision. A myope, and none but a myope, could read fluently a paper brought close to his eyes, with concave glasses, and *vice versa*.

I believe the effects of Belladonna were known to mendicants, and used by them to give the appearance of amaurosis, long before it was employed by surgeons for the purpose of dilating the pupil.

Pectoral complaints are often asserted to exist where they do not. The general appearance of the patient will soon indicate whether they are real or assumed; and we should always examine the sputa, as they have been ejected before our eyes. I have known an instance where an imposition was attempted by a person who had procured a quantity of bullock's blood for the purpose of covering his deception.

The action of the heart and arteries is often fraudulently excited or depressed. Tobacco is used for the latter purpose, and various stimulants for the former. For the following interesting case I am obliged to Dr. Cumin of Glasgow.

* See a valuable paper by Dr. Vetch, Edin. Med. and Surg. Journal, vol. iv. p. 157.

CASE LXXVIII.

Increased action of the Heart produced at Will.

Private F—, —— regiment, was shown to me by the assistant-surgeon soon after I joined that battalion, (March 1814,) as a man proper to be discharged from the service on account of enlargement and diseased action of the heart. On examination the heart was seen beating violently in the epigastrium with occasional intermissions; his countenance betrayed, at the moment of examination, a very anxious and distressed, but fixed aspect. No doubts of the reality of the disease were entertained by the assistant-surgeon, by myself, or, as far as I could learn, by the staff-surgeon who had inspected this individual. But on inquiry many weeks afterwards, I found that his appetite and spirits were good, and that when not the object of attention, he appeared active, and careless of his complaints. I now determined to subject him to a strict and continued scrutiny. I admitted him into hospital, and after carefully observing him for some days, I made him swallow such a dose of opium as threw him into a state of insensibility, but not of deep sleep; the palpitation of the heart was not now perceptible. I afterwards found that I could render it very imperfect at any time, by throwing the patient's head well back, so as to destroy that voluntary combination of muscular action which I believe to have produced the palpitation. That the apparent disease was produced by the man's own efforts, I had then, and I still have, no doubt; and the only way in which it can be accounted for is, by supposing that he had the power of throwing the muscles which narrow the chest into sudden and strong action, at the moment when the apex of the heart made its stroke upwards. After a serious admonition, I suffered F— to return to his duty, at which he remained without making any farther complaint of this alarming disease, which had very nearly procured him his discharge from the service.*

It is by no means an unusual occurrence for the pulse to cease in the radial artery, on taking a full inspiration, and continuing to retain the breath as long as possible, and the learned and ingenious Dr. Parry, in his "Elements of Physiology," states,

* Cheyne, in his "English Malady," 8vo. London, 1733, p. 209, gives a very interesting case of the Honourable Colonel Townsend, who, by laying himself gently down on his back, and remaining quiet, could influence the movements of his heart and arteries so far, as to become, to all appearance, dead. Dr. Cleghorn of Glasgow, mentions a similar case. See "Males' Forensic Medicine," 2d. ed. p. 238.

that the pulse in these arteries has been frequently suspended for several days. I have known some instances where attempts were made to accelerate the pulse, and give the appearance of fever, by violently knocking the elbow against a wall, while the tongue was covered with powdered chalk. Some of these attempts were the more disgusting, that they were not exclusively confined to persons of the lower orders.

Affections of the liver are very frequently said to exist where they do not; a strict examination, in general, will detect them. Some instances have been reported to me, where an imitation of enlargement and hardness of the abdomen, with diseased viscera was attempted, by taking a long inspiration, by which the diaphragm was forcibly pressed downwards, and consequently forced the abdominal contents forwards. The detection was simple, as it was only necessary to wait until the effort was finished, or to surprise the patient in his sleep or otherwise. The jaundiced colour of the skin has been imitated by the application of dyeing materials; as the flowers of broom, the stamens of the iris, and carthamus seeds: but the imposture is a clumsy one, and easily detected by the appearance of the eye, to which nothing but genuine jaundice can give the yellow tint.

Affections of the intestinal canal are very often feigned; it is impossible that these affections can be of long continuance, without very sensibly impairing the general health. If, therefore, a person of a ruddy countenance, and of muscular vigour, states to us, that he has long suffered in this way, we cannot be accused of unreasonable scepticism if we discredit his report. Diarrhoea was during the late war frequently excited among the sailors, by a mixture of vinegar and burnt cork, which in many instances proved fatal. See Hutchison in Med. and Phys. Journal for Feb. 1824. In general hospitals, men who have been admitted with dysentery often affect its continuance, in order to evade their duty, and to enjoy the indulgences of the hospital. I had many opportunities of seeing this disposition at Abrantes, while doing duty with Dr. Somers, physician in chief, who paid particular attention to the disease, and who has published a very able tract on the employment of venesection in it.* We there made it a rule accurately to examine the dejections, but it was discovered that the orderly men were often bribed to supply the bed-pan which had been used by a patient in the advanced stage of the disease, to those who were convalescent, and it was shown at their bed-sides as a specimen of

* *Medical Suggestions for the Treatment of Dysentery, &c.* by Edmond Sigismond Somers, M. D. Physician in chief to the allied armies on the Peninsula, 8vo. London, 1815.

their own morbid discharges. At that station also, we found under the bed of a man, who had been long in hospital several loose sheets of Zimmerman's "Treatise on Dysentery," which he had purloined from some of the medical officers, and from which he was in the daily habit of enumerating his changes of symptoms: notwithstanding all the ingenuity of this person, he at last fell into a dropsical state, and died.

In examining the stools, we should hold in mind the unnatural colours of which they may be tinged by various medicinal substances. By the employment of hematoxylon and its preparations, they became of a bloody red. Decoctions of senna tinge them deep green. Calomel renders them green also, and often streaked with yellow. By the use of the Lamego, and other deep coloured wines of Portugal, the stools acquire a tinge almost approaching to black. Many hypochondriacs have been greatly terrified on observing this effect, without being aware of its cause, and their terrors have been increased, by the effects which rhubarb, given to clear their bowels, has had upon their urine. I have known some attempts made to impose upon medical men, by persons who have been acquainted with these facts.

It is in general hospitals, where soldiers are separated from the medical officers of their own corps, who are intimately acquainted with their character, that impositions are most frequently attempted. But wherever such persons may be met with, we can never go wrong, if we treat them as if the disease they feign really existed. The most approved methods of cure for many diseases, as incontinence of urine, for instance, and chronic rheumatism, are sufficiently painful, if persevered in, to shake the constancy of an impostor not very hardened in guilt. I have seen cases, however, where blisters to the sacrum and to the limbs, as well as the shower bath, and nauseating doses of emetic tartar, have been borne with a constancy worthy of a better cause. A case has been reported to me, where a dragoon bore very severe riding-school duty for some weeks, secured to his horse, before he acknowledged that his chronic rheumatism was assumed. I saw a case where the patient even admitted of all the preparatory measures for amputation, before he thought proper to relax his knee-joint;* and another, where he allowed himself to be all but drowned in a deep lake, into which he was suddenly plunged from a boat, before he stretched out his arm to save himself by swimming, an exercise in which he was well known to excel.

The annals of civil life, as well as those of the navy and

* See a paper by Mr. Carmichael, in the Transactions of the College of Physicians of Dublin, vol. ii. p. 377, where a very instructive case is detailed.

army, during former wars, afford numerous instances of even more gross impositions than any of those I have alluded to. I shall not pursue the subject farther, but content myself with warning the medical officer, who is intrusted with the examination of military persons claiming leave of absence, exemption from duty, or pecuniary rewards for their sufferings, to be incessantly on his guard against imposition, or the exaggeration of accidental and trifling symptoms or appearances. The cicatrices of common ulcers have been shown as those of gunshot wounds, and I once saw the mark of a *square* blister pointed out as the effect of contusion from a cannon *ball*. But if the person subjected to the surgeon's examination appears to him really to merit these indulgences, he should recollect, that if he owes a duty to the service, he owes one also to justice and to humanity.*

* On Feigned Diseases see the following:—

Mr. Hutchison's "Practical Observations on Surgery," London, 1826.

Staff-Surgeon Marshall in the 89th No. of the Edin. Med. and Surg. Journal.

Dr. Cheyne in Dublin Hospital Reports, vol. iv. anno 1827.

Beck's Elements of Medical Jurisprudence, 2d edition, by Dunlop, London, anno 1825.

For a useful paper on the subject, see also Hutchison in Med. and Phys. Journal for February, 1824.

An excellent article on "Simulation Des Maladies," will be found in the 51st volume of the Dictionnaire des Sciences, Medicale, by Baron Percy and Laurent. In that article, the following works are referred to on the subject:—

Luther. Dissertatio de morbis simulatis ac dissimulatis, 4to. Enfordid, 1728.

Boecler. Epistola occasione fraudulentio mulieris, quæ per totam fere vitam ficto monstroso ventre omnium decepit oculos, 4to. Argentorati, 1728.

Vogel. Dissertatio de simulatis morbis, et quomodo eos dignoscere liceat, 4to. Gottingæ, 1769.

Neumann. Dissertatio de morborum simulatione, 4to. Vittembergo, 1788.

Schneider. Dissertatio de morborum fictione, 4to. Francofurti ad Viadrum, 1794.

I have not met with any of them.

CHAPTER XXII.

ON VARIOLA AND VACCINATION.

To enlarge upon the advantages of vaccination to mankind would be quite superfluous;—to deny that, like all other human inventions, it is not infallible, would be both absurd and injudicious;—vaccination possesses too many real merits to require false or exaggerated praise. From causes which it may, perhaps, never be permitted us to penetrate, that terrible scourge, the ravages of which are so pre-eminently neutralized by the happy discovery of Jenner, attacks the unprotected with redoubled violence during certain epidemic visitations; and even those who have undergone the cow-pock in an unequivocal manner, bear a share in the suffering, though rarely in the mortality. It has fallen to my lot to have witnessed some very interesting and important facts connected with small-pox and with vaccination; of these I deemed it a paramount duty to give the earliest intelligence to the public in the 56th Number of the Edinburgh Medical and Surgical Journal, vol. xiv. for the more minute particulars of which I must refer to that publication, and I shall here content myself with condensing the information into a less diffuse shape.*

From the decided part which his Royal Highness the commander-in-chief early took on the subject of vaccination, and from the universality of its adoption by army practitioners, small-pox has become a disease of very rare occurrence in military life. It has raged around our camps and barracks, and carried off its victims from under our very walls, and even from the houses where our detached troops have been quartered, while it has left them unmolested. In Scotland, this exemption has been no less remarkable than in other parts of the empire, and for the years 1816 and 1817, I do not find one case of small-pox mentioned in the records of the military hospitals in Edinburgh: neither did varicella occur within the same period in these hospitals. One man, however, was received into the depot hospital at Queensberry House from the Castle barracks,

* These cases have given rise to some ingenious papers and criticisms in various periodical works, especially in the 15th and 16th volumes of the Edinburgh Medical and Surgical Journal: they are particularly noticed in a valuable work by Dr. Thomson on the "Varioloid Epidemic," 8vo. London, 1820; and they are in part detailed in Dr. Monro's "Observations on the different Kinds of Small-pox," 8vo. Edinburgh, 1818.

labouring under the latter disease, on the 14th of May 1818. He asserted, on a general examination of the depot some time before; that he had had small-pox. No very decisive mark of them could, however, be traced on him, and his name was noted in order to his being vaccinated, but before that operation was performed, he was seized with varicella, which was extremely slight, and confined him to the hospital only four days. After his dismissal from the hospital, the vaccination was performed; but the vesicle did not satisfy Dr. Bartlet, who was then doing the duties of the depot, nor had the man any constitutional affection. From an examination of all the circumstances of this man's case, it is rendered probable that his assertion with regard to his having previously had small-pox was perfectly correct.

In three days after the above individual had been admitted into hospital, an unequivocal case of small-pox was received. It occurred in a Highland soldier belonging to a recruiting party, who had never had the disease before, and who had obstinately resisted all the persuasions that were employed to procure his submission to vaccination. This man passed through the small-pox in a manner not dissimilar from that which is usually observed in adults, and was dismissed from hospital in thirty-three days after admission.

On the 17th of May, a child of the hospital sergeant's, who had been vaccinated in Ireland, in 1811, and who has two very perfect cicatrices in his arm,* was taken ill with a disease, which I at first conceived to have been modified small-pox, but which, on consultation with Professor Thompson, surgeon to the forces, in charge of the Queensberry Hospital, I afterwards considered as varicella. His brother, a boy of 11, who had been vaccinated at three months old, and who has a perfect cicatrix, escaped all complaint whatever. This boy's case was very slight in its progress, although ushered in with smart fever; the eruption was pustular on his face, and vesicular on his legs; it soon dried up, and his illness lasted upon the whole but eight days.

On the 6th of June, a recruit was admitted into the same hospital, whose case Dr. Thomson, for the first two days, conceived to have been varicella, but which he afterwards considered and reported as affording, in its progress, maturation, and decline, a good specimen of the modified small-pox, so well described by Dr. Willan, and of which several interesting cases are reported in the 55th number of the Edinburgh Medical and Surgical Journal, as having occurred in that city during the pre-

* By perfect cicatrix, I understand a permanent circular cicatrix, about five lines in diameter, and a little depressed, the surface of which is marked with very minute pits, or indentations, denoting the number of cells of which the vesicle had been composed.

ceding six months. The subject of this case had a cicatrix of variolous inoculation on his arm; from twenty to thirty pits of small-pox were observable on his body, and he said that he passed regularly through that disease from inoculation, before he entered the army. This man's case was severe upon the whole, but by no means so much so as is usual when the disease attacks persons of adult age for the first time.

On the 9th of June, a child of my own, who had been vaccinated upwards of ten years before, and who went through the disease most satisfactorily, and now has two perfect cicatrices on his arms, took ill. This boy was vaccinated by myself when three months old, and I had every reason to be satisfied with the genuineness of the matter. He had often been exposed to variolous contagion in Spain, France, and Portugal, and particularly in the year 1817, at Portsmouth. His younger brother, who had been vaccinated eight years previously, and exhibited one perfect cicatrix on his arm, was also ill some days before, but so very slightly, as not at the time to have attracted any particular attention. Both these boys, after coming from school, had occasionally played in the hospital airing-ground, and sergeant's rooms, and in the reading-room of the Army Medical Society, which is held in the hospital, while all the preceding cases were under treatment. Three older members of my family, two of whom had been vaccinated upwards of fourteen years before, and the other had had small-pox, escaped all disease whatever, although the last slept in the same room, and for some time in the same bed with the sick boy, and one of his vaccinated sisters had been in constant attendance on him. The eruption on this boy was vesicular, his fever before the eruption was very smart, but declined immediately after; he was confined for eight days to his room, after which period he recovered rapidly. The case I at first considered as an instance of aggravated varicella, and under that impression, I delivered to Dr. Bartlet, of the 88th regiment, four lancets charged with lymph from his body, for the purpose of ascertaining by experiment some points in the natural history of that disease, which are still in obscurity, notwithstanding the observations of the late Drs. Willan and Heberden. Mr. Bryce, however, and Dr. Monro, who saw my son after the lymph taken from him had been inserted (within the space of two hours) into the arms of six children who never had had small-pox, cow-pock, nor varicella, and who were selected as the most proper subjects for trying an experiment upon, at once pronounced his case an example of the modified small-pox, with which Dr. Monro's children had been affected. It may well be imagined what a strong degree of interest was excited by this circumstance. The experiment, highly important in itself, if the disease communicated were purely va-

ricella, became doubly so on the supposition, that it should prove to be small-pox; for we had been taught to believe that the modified small-pox produces the real disease in persons who have never gone through it before, or who have not been previously vaccinated; but that it still retains its modified character in persons who have previously undergone either of these diseases. The results of these experiments have been detailed with a very great degree of minuteness, from the Journal of Dr. Bartlet, in the paper already alluded to; suffice it to say here, that there can be no doubt that the disease which these children underwent was variola, varying in violence in the different subjects, and being very severe in one or two; they all went happily through the disease. Three adult soldiers, who had had communication with the inoculated children, fell ill in succession in the course of ten days. These three men exhibited several marks of previous small-pox, particularly the last, on whose arm there was the cicatrix of the inoculation, and they all recollect their having had the disease. In these three men unequivocal variola took place, severe in its nature, but modified by their having previously gone through the disease.

Mr. Burns, of Glasgow, appears to have been the first to try the experiment.—See Edin. Medical and Surgical Journal, vol. iii. p. 158.

Besides these persons, one adult and three children who had had free communication with the inoculated, were also taken ill in the castle during the early part of the month of July; the adult so slightly, as never to have been received into hospital, nor to have omitted his duty for a single day. He said he had had small-pox twenty-four years before, and bore the mark of inoculation, as well as of several pits of that disease. A few pustules, of a horny nature, appeared on his face, breast, and arms, preceded by a smart degree of fever of short duration, and dried up rapidly in four or five days. Of the children, one of eighteen months old, who had been vaccinated about fifteen months before, and exhibited a perfect cicatrix, had a slight feverish attack, succeeded by a few pustules of the same horny nature as the adult, which soon dried up. A second child, who had not been vaccinated, an infant of three weeks old, who was nursed by the mother of an inoculated child, and who slept in the same bed with it, had, at the same time with the adult and the first mentioned child, an eruption of the same slight character and short duration as they had. But a third child of twelve months old, whose parents had neglected to bring it forward for vaccination, had, at the same period, a very severe affection resembling that of one of the inoculated children.

On the 4th of August, I received intimation from Dr. Bartlet, that a soldier who was then, and had been for some time previ-

ously in the castle hospital, and on whom we were about to perform the operation for artificial pupil, had been seized with a febrile attack, which the doctor strongly suspected was the eruptive fever of small-pox. This man had represented himself as having had small-pox, and there were some marks on his body, which, in conjunction with his assertion, were sufficient to justify the surgeon in considering him as having passed through that disease; he afterwards confessed that he had been guilty of a deception. This imprudent man was on the same floor with the adults already mentioned, only separated from them by a narrow passage, and he had even conversed with one of them during the continuance of his disease. The case terminated fatally on the morning of the 13th day of the eruption, being a very aggravated form of confluent small-pox. It obviously would be presumptuous to assert with perfect confidence, that all these cases sprang from one and the same source, although there is the strongest reason to suppose that they did.

I have already stated, that the inoculation was instituted under the impression that the disease to be communicated was varicella. When, however, I saw the first adult take a disease which spared neither the vaccinated nor the variolated, (although attacking the latter in a proportion incalculably greater,) and which I myself, and many eminent gentlemen of Edinburgh, conceived to be decidedly a form of small-pox, I at once put a stop to all farther experiments among the troops. I tried, however, upon myself, what I did not choose to do upon the soldiers whose health was committed to my care. From one of the children I inoculated myself. I had had small-pox, but never varicella: no result followed. Dr. Bartlet, and his brother, who had also had small-pox, but not varicella to their knowledge, tried the same experiment with a similar result; these, to be sure, are negative trials. Dr. Bartlet, in order to throw some farther *positive* light on the natural history of varicella, inoculated seven children who had neither had cow-pox, small-pox, nor chicken-pox, with lymph taken from a child of Mr. Wishart, surgeon of Edinburgh, who laboured under genuine unequivocal varicella. No disease was produced in any of the children thus inoculated. This Dr. Bartlet conceived *might* have proceeded from the virus having been collected on glass, and afterwards liquified by steam.

After the most mature consideration, I must explicitly avow, that nothing has occurred in the cases I have related, which has, in the smallest degree, shaken my opinion of the great and pre-eminent importance of the practice of vaccination, whether we view it as a preventive of small-pox in a vast majority of cases, or as a most effectual neutralizer of its malignity in the comparatively few instances in which, from some peculiarity of consti-

tution, or some anomaly in the process, hitherto not fully developed, it has failed to afford this permanent security. If the more anomalous among these cases are considered as merely aggravated instances of varicella, the value of the Jennerian practice is in no shape affected by them, except, indeed, that it is clearly shown, that the practice renders not only variola, but varicella also, more mild. If, on the other hand, they are considered as the horn-pock, or the steen-pock, that disease, as I understand from the first medical authorities, was well known in this country before the introduction of vaccination, and frequently occurred in persons who had previously gone through the genuine small-pox, although never noticed of later years as an objection to variolous inoculation. In this case, also, vaccination will be found to have manifested its neutralizing powers. But I have witnessed it still more remarkably among the children of the lower class in the neighbourhood of Edinburgh castle, where, while unmitigated small-pox has raged violently among the non-vaccinated children, many instances have occurred of those who have gone through that process, having the complaint in the very mildest possible form, and many of them escaping it altogether; a fact exhibiting the results of a more rigid ordeal of the preventive powers of vaccination, than can be imagined by those who have not witnessed the incredibly crowded and confined apartments in which these compact masses of human beings gasp for air; while, from the mutual friction of their bodies under the same scanty covering, the most intimate contact takes place between the sound and the diseased, and in many instances effects a complete and constantly renewed inoculation.

Finally, if it be admitted that the disease in the adults was small-pox, whether genuine or modified, of which, indeed, there can be no doubt, it adds five more additional proofs to those already on record, of that disease occurring a second time in the same individual, and with this very remarkable circumstance attending them, that they all occurred consecutively, and in all human probability from the same source of infection.

In my paper in the Edinburgh Medical and Surgical Journal, I have given references to considerably more than a hundred authorities, for cases where small-pox has occurred a second time in the same individual; many more I know have been collected by others.* It is probable that still more are to be found on record; that many are daily occurring within the reach of inquirers; and that more have escaped all observation whatever since the time of Rhases, or in the unbounded confidence of practitioners in the universality of the law, that the disease can be taken but once, have been set down as cases of aggravated or

* See Dr. Smyth's Thesis, *De Variolis Secundariis*. Edin. 1819

confluent varicella. A sufficient number of unquestionable cases, however, are extant, to prove, that if vaccination does not afford an infallible preventive of the subsequent occurrence of small-pox in all cases, neither does the previous existence even of small-pox itself act as an infallible preventive of its future recurrence.

Laws which we can never develope govern the susceptibility to variolous contagion; and it is highly probable, as has been observed by the ingenious Jenner, "that the susceptibility to receive it always remains through life, but under various modifications or gradations, from that point where it passes silently and imperceptibly through the constitution, (as is frequently the case with cow-pock,) up to that where it appears in a confluent state, and with such violence as to destroy life." The fact of small-pox partially affecting persons who have already had the disease, while employed as nurses to children labouring under it, proves this to a certain extent; but the existence of variolous pustules on the body of the fetus, capable of affording the genuine matter, and of communicating the disease to others, by inoculation, while its mother has been unaffected, places the fact in a still stronger, and in an unquestionable point of view.*

The observations which I have now concluded were elicited by the diseases which appeared in the hospitals, and among the soldiers themselves, and their children, in the year 1818. I find one case which occurred more recently in the person of a soldier's wife of the 80th regiment, very well deserving of notice. It is a case which we have every reason to suppose that variola occurred after the most perfect vaccination that can be conceived, inasmuch as the subject had contracted the vaccine disease directly from the cow. In support of this fact, we have the testimony of the woman herself, a person of good character; we have the fact of her having for a series of years resisted variolous contagion; and we have the still stronger fact, that when, in adult life, she did take the disease, it was extremely mild; for the eruption was complete on the 7th, and declined generally on the 8th day, scabs forming on every part of the surface; the pustules were small, and not numerous, and she had no secondary fever. Of the truth of the woman's having had the vaccine disease, therefore, there can be no reasonable cause of doubt, for nothing but previous vaccination could have rendered it so mild in an adult subject. If we wanted any farther proof of the fallacy of the doctrine which teaches that vaccination fails in Scotland and elsewhere, solely from the want of making a certain number of punctures in a certain manner, this fact would suffice. For I apprehend it must be admitted, that the lymph di-

* See Jenner, in the Med. Chir. Trans. vol. i. p. 271; and also the works of Mead and Mauriceau.

rived directly from the cow is at least as effectual as that which any vaccinator can employ, however dexterously he may insert it.

CASE LXXIX.

*Of Small-pox, after Vaccine Disease directly taken from the Cow.**

Mrs. C. aged 36, the wife of one of the band, reported herself to Mr. Lightbody, the surgeon of the 80th regiment, on the 1st of December, 1819, with general symptoms of pyrexia of two days' standing; some suitable medicines were prescribed. On the 4th an eruption made its appearance on the face, hands, arms, and body. On the sixth, (3d day of eruption,) it had a distinct pustular appearance, some of its apices already containing a white fluid. On the 10th, (7th day of eruption,) the process of maturation appeared to be completed; the pustules were filled with a straw-coloured fluid, and some of them, especially on the face, had broken, and discharged their contents. On the 11th, (8th day of eruption,) declination appeared general, scabs forming on every part of the surface; from this time she continued to recover. The eruption was distinct and well marked; the pustules were not numerous; they were in general small; and no where did they coalesce. She had a good deal of fever throughout, but, on the whole, the disease was mild and favourable. She was not sensible of having been exposed to contagion of late; but she was lodging, when attacked, in a little, filthy and confined, room, in a back street, whence she was removed previous to the appearance of the eruption. She got accommodation in a barrack-room in which there was only another family, an infant belonging to which was at the time under the process of vaccination, which proceeded favourably, without seeming to be influenced by its variolous neighbour.

It appears from Mrs. C.'s information, that when about fourteen years of age, being a dairy maid in Norfolk, she had a number of sores on her hands and arms, which she caught from the cow's udders, and which were at the time said by a doctor who was consulted, to be what was called cow-pock; that afterwards, when a house servant, she was, with several others in the same family, cut in both arms for the cow-pock, and perfectly recollects having one on the right arm, and, she thinks, one on the left; the marks, however, are so indistinct as to be scarcely discernible. When the examination was made in 1817,

* Similar cases will be found in the *Edin. Med. and Surg. Journal*, vol. iii. p. 41.

for the discovery of persons in the regiment who had not had variola, or been vaccinated, "I found it remarked in the register," says Mr. Lightbody, "in the hand-writing of Dr. Nicoll, that Mrs. C. took the cow-pock from the cow, when a dairy maid in Norfolk."

While these sheets are at press, I have myself seen this woman, and am perfectly satisfied of the authenticity of the above facts. I am here naturally led into a remark on the employment of Mr. Bryce's test, which, did we consider it merely as a speculation, is, perhaps, one of the neatest and most ingenious that has ever been proposed; but when we reflect on its great practical utility, we will naturally esteem it for qualities of far greater importance; and we will be led to class its amiable proposer as one of the ablest supporters of vaccination, and among the greatest benefactors to the rising generation. This test, therefore, is well worthy of adoption universally, and I believe there are few army surgeons who not appreciate its value; for although epidemics may occasionally arise, where, from causes inscrutable to human inquiry, variola will occur among the protected, yet, upon the whole, we view it as a most untoward occurrence, when that disease appears in our military hospitals; and every surgeon is anxious to show, from his register of vaccination, that so far as he is concerned, every human precaution has been taken.

On the medical treatment to be employed in small-pox, whether in its ordinary or its modified forms, it is unnecessary to dwell. In the latter disease, the symptoms are in general so mild as to require merely open bowels, cleanliness, and pure air. Where they possess an unusual degree of violence, that violence is suddenly checked, in a way as marked and decided as if an insurmountable barrier had been opposed to its farther progress, and it has been decreed, that "thus far and no farther should it go;" all fever ceases, and the eruption rapidly dries up, and scales off. The period of the eruption at which this happy and sudden transition takes place, is not the same in all cases. From the 5th to the 7th day is the period I have usually marked,—sooner or later, according to the mildness of the disease; but at whatever time it may occur, the secondary fever, which is so frequently the fatal symptom, either never shows itself, or is so trifling as not to attract particular notice. In the unmodified disease, where it occurs in adult subjects, our most powerful remedies are called for, and among them venesection is often necessary, and markedly beneficial. I had an opportunity of seeing this very clearly illustrated some time ago. Four adults, recruits, were seized with variola at Portsmouth; the determination to the head and lungs was violent to a degree, and copious venesection was had recourse to in three of the individuals; these three re-

covered, while the fourth, in whom venesection was not performed, after having passed through the violence of the disease, sunk under extensive formations of pus, which appeared in the form of abscesses, dispersed almost all over his body, and affording a most disgusting spectacle.

CHAPTER XXIII.

OESERVATIONS ON SYPHILIS.

I do not propose to inquire into, or rather, to recapitulate the arguments on the origin of Syphilis, since nothing is left to be said on that point that has not already been collected from poets, historians, and physicians. From whatever source it may have sprung, the army possesses the undisputed but melancholy claim of having mainly contributed to the propagation of that terrible disease, which spread over the greater part of Europe soon after the siege of Naples. The army surgeons could not have shut their eyes to the ravages of a complaint in which they were so peculiarly interested; and accordingly we find, that one of their body, Marcellus Cumanus, who served with the Venetian troops under Charles VIII. in the campaign of 1495, was the earliest author who wrote concerning the history and cure of syphilis. Fracastorius, another surgeon in the same army, followed him on the same subject, and has left a poetical account of the disease, remarkable both for its accuracy and its elegance. Ferrius, Vesalius, Botallus, Paré, and many of the older army surgeons, signalized themselves in this particular department of their profession; and, to the same class of practitioners, at various subsequent periods, we owe several important accessions to our knowledge of the subject.

Indeed, the opportunities which military hospitals afford for extensive observations and comparisons, are highly favourable to the elucidation of the natural history of this disease; so that it is really a greater object of surprise that more light has not been thrown upon the subject by the officers of these establishments, (especially considering that no interested views could have interfered,) than that they should at length have fallen into the fair and philosophic course of investigation. Nothing can fully account for this, except the undoubting reliance that has been placed,—justly in many instances,—on the sanative powers of

mercury. But, notwithstanding its unquestionable efficacy, the united experience of medical men of all countries, and in all ages, has shown that great inconveniences often result even under the most judicious mode of managing it; while, from abuses in the quantity, but especially in the *irregularity* with which it has been exhibited, effects so deplorable have proceeded, as to leave no doubt that in these instances it has been infinitely more destructive to health than the diseases for the removal of which it was originally employed. These distressing consequences were obvious to the practitioners in the military hospitals, as well as to those in civil life. To advert more particularly to those of our own country,—more than half a century ago, when mercury was in the highest repute, Dr. Brocklesby stated his conviction, that, instead of “rubbing in such extravagant loads” of that medicine, it was necessary only to employ as much as was sufficient to cause a slight swelling and soreness of the gums, and a spitting not exceeding one pint in twenty-four hours.* About the same time that Dr. Brocklesby practised in the military hospitals, the results of some experiments instituted by Mr. Gataker, at the regimental hospital of his Royal Highness the Duke of Cumberland, were also laid before the public.† These particularly related to the use of sarsaparilla and corrosive sublimate, and contain many acute observations on the venereal disease. Although a very decided friend to mercury, Gataker urged the necessity of caution in its employment; indeed, throughout the whole of his observations, he shows great judgment and moderation, and evinces his desire to simplify the study of syphilis, which had been rendered so complicated by the minute descriptions of Astruc, and the variety of symptoms assigned by him and others as characterizing that disease, that Gataker was led to observe, that, from the accounts of these authors, “it was difficult to say when a man was *not* poxed.” Sir William Fordyce, then a surgeon in the guards, had previously (in 1751) tried some interesting experiments on the use of sarsaparilla, to be seen in the first volume of the London Medical Communications.

During the American war several experiments were tried on the utility of opium in syphilis, in the British military hospitals in North America, by Mr. Grant, the senior surgeon on that service, by Dr. North, Mr. Weir, Mr. Foster, and others; and similar experiments were tried by the medical officers of the auxiliary troops, by Dr. Michaelis, physician-general to the Hessian army, and by Dr. Schöepff, physician to that of Anspach. The accounts of these experiments may be seen in the “London Medical Journal,” vol. vi. and in the Medical Communica-

* *Economical and Medical Observations.* London, 1764, p. 296.

† *Essays on Medical Subjects* By Thomas Gataker. London, 1764.

tions, vol. i. During the war of the French Revolution, trials of the anti-syphilitic powers of the acids and other substances abounding in oxygen, were instituted at the artillery hospital at Woolwich by Dr. Rollo, surgeon-general of the royal artillery, and Mr. Cruickshank, chemist to the ordnance, and a surgeon in that service. An account of these is given by Dr. Rollo in his *Treatise on Diabetes*.*

During the course of the Peninsular war, Dr. Fergusson, inspector of hospitals, published a most important paper in the 4th volume of the *Medico-Chirurgical Transactions*, in which he showed very clearly that the venereal disease, as it appeared in Portugal, was curable without the employment of mercury. In the 8th volume of that work, Mr. Guthrie, deputy inspector of military hospitals, and Mr. Rose, surgeon of the guards, published two highly valuable papers on the same subject. In the 53d number of the *Edinburgh Medical and Surgical Journal* for January, 1818, Professor Thomson, surgeon to the forces, gave an account of the trials which he had instituted in the military hospitals of Edinburgh castle for the cure of syphilis without mercury; and in the 54th and 55th numbers of the same *Journal*, for April and July 1818, I submitted to the public such observations and tables as I felt myself fully warranted to do by the experiments tried under my own eye in the hospitals in North Britain.

Mr. Evans, surgeon of the 57th regiment, has published within the last year the first part of a work on "Ulcerations of the genitals," especially on those ulcers which are not to be considered as the primary affections of syphilis, and which do not require mercury for their cure. Judging from what this gentleman has already done, great expectations may be formed of what he will hereafter do on this interesting point.

I shall not inquire into all that has been done in the foreign military hospitals on this subject. The most important trials have been those by Dr. De Coste, physician to the French army at the military hospital at Lisle, on the use of opium, *Journal de Medecine Militaire, par De Horne, tome vi.* Of 26 patients, 15 were cured, 5 doubtful, and 6 failures; those of De Horne, on the use of corrosive sublimate; but, above all, those on the latter substance, by Baron Van Swieten, at the military hospital at Vienna, by which he has rendered a most important service to physic. He was aware of the injuries so often inflicted by salivation, and he introduced the alternative cure by the oxymuriate of mercury into general notice. Nothing could exceed the violence of the opposition to this plan; it was very generally decried, and by many it was pronounced a monstrous, inhuman,

* The plan had been tried long before in India by some of the regimental surgeons with great success.

and unjustifiable measure. Van Swieten, who held the highest medical station at Vienna, and had the control of the military medical department, sent 300 soldiers to the hospital at Saint Mark, in order to institute upon them an experiment on a large scale as to the power of his new remedy. The results of this measure are sufficiently interesting, and strongly illustrate the difficulty of introducing any innovation in the treatment of the venereal disease.* With the exception of six who were affected with incurable caries of the bones previous to their admission, *every one of these individuals went out of hospital cured.* In a little time afterwards, an accusation was brought before one of the highest military tribunals, in which Locher, the physician of the hospital, was charged with dismissing from that establishment 300 soldiers not only uncured, but even in a far worse condition than when they entered it. Fortunately the records of the hospital were in existence, but what was still more convincing, all the soldiers were at the very time within the walls of Vienna. "The physician," says Van Swieten, "insisted on a strict examination of the matter by law, nor did I neglect doing it. The delays of the law were spun out under various pretexts, and the calumniator, in the mean time, ran away, died and escaped his deserts. Locher afterwards quietly continued the cure of the venereal disease in his usual manner." Such is the original history of a remedy which has now been received into private and hospital practice all over the continent of Europe; and we must either suppose that the great mass of continental surgeons are profoundly ignorant of their profession, or in a combination to deceive us, or else we must admit that corrosive sublimate really possesses those virtues attributed to it by Van Swieten. Indeed, independent of the details in books, innumerable opportunities have been afforded to British surgeons since the peace, of seeing the unquestionable efficacy of this medicine at the hospitals in Paris, and yet a very few years since, no orthodox English practitioner would have trusted his patient's safety to it. It may, indeed, be possible, that difference of climate, constitution, and mode of life, in many cases contribute to the superior efficacy of this remedy among the inhabitants of the continent.

Such being the prejudices against a mercurial preparation, we cannot wonder at the treatment which the proposals made from time to time of curing the disease *without* mercury have met with. These prejudices are now much less violent than they were some years ago, when the idea of curing the disease in that manner was looked upon as so absurd, that the person who might propose it, would at best be designated as a visionary who was himself deceived; but the more common opinion advanced was, that he wilfully deceived others. Many medical men acted

* See his Comment on the 1477th Aphorism of Boerhaave.

on these occasions as if they had a personal interest in supporting the omnipotence of mercury. When a most ingenious and ardent philosopher of this country, Dr. Beddoes, began some years since his course of trials of the acids, he was assailed at all quarters; ridicule and abuse were lavishly thrown upon him, his opinions and his supporters, and a fact, which a common share of candour on the part of the judges, and a little more perseverance on the part of those whose practice was to be judged, would have completely established, was lost to the medical world. A show of candour was indeed made, and the results of several trials were published; to select any of these for animadversion would be invidious, but one common strain ran through them all, and the value of the acids, and of other substitutes for mercury, were pronounced upon by men who assumed, (what has since been shown to have been a most gratuitous assumption,) that no other remedy existed, capable of curing the venereal disease, and with this very assumption did they come forward to the trial, and pronounce their sentence. With a similar spirit of prejudication, De Blegny and De Thiery were ranked as visionaries; and as for Fernelius and Palmarius, they were permitted to slumber on their shelves unnoticed, while the modest Morgagni, whose works were better known than the others in England, by a translation into our mother tongue, was just quoted to be rejected, and his account of the cure of syphilis without mercury was classed with the useless and antiquated physiology, which dims though it can never extinguish the lustre of his immortal work. As for the historical notices of Leo Africanus and De Blond, they were rejected with contempt.

Unfortunately for the attempts of those who were anxious to investigate the anti-syphilitic powers of various remedies, the smallest disappointment checked their hopes, and they were driven by groundless fears into the immediate employment of mercury. Indeed, many of the friends of Dr. Beddoes fell into this very error, and, not being aware that the secondary symptoms would yield with time and steadiness, they resigned many of the advantages they had gained,—but not all,—for the testimony in favour of the acids were so strong, and so unanswerable, that they were admitted into a sort of co-partnership with mercury, and their power was in part, though very reluctantly, acknowledged. It is a very remarkable fact, that, in a variety of instances, whenever a rival medicine has started up in opposition to mercury, while the blind supporters of that mineral seemed to be confirmed in their conviction of its exclusive power, the rival is often allowed to have “some powers,” or “under certain circumstances to be useful,” or “to be applicable where mercury has aggravated the complaint,” &c. &c. The roguery of the quacks in putting corrosive sublimate into their boasted syrups said to be composed of vegetables alone, cannot

be adduced to controvert the fact; it only proves that the ignorant quack and the learned physician were equally bigoted mercurialists. The annals of our profession unfortunately disclose a striking coincidence between them in more points than one.

But it has not been among professional men alone that these prejudices have existed; the diseased themselves have, from education and from habit, gone hand in hand with their medical advisers, who have doubtless been often forced to employ mercury in compliance with the wishes of their patients, rather than from any conviction in their own minds, either of its necessity or propriety. An old French author has made a very shrewd remark upon this subject. "When pocky people," says Nicholas de Blegny, "have been told that they can't be recovered but by salivation, and that they are only quacks and empirics who promise to cure it by other means, they become deaf to all farther instructions and advice, and firmly believe that all other methods are dangerous and erroneous; nay, they will hardly believe that mercury can produce any other than salutary evacuations. But, which is yet more strange, they believe they have no reason to complain, whatever be the bad effects and consequences of this remedy; and those patients who do are said to be splenetic."

"But it is far otherwisc, when the patient happens to be managed by other remedies, for the slightest indisposition is ascribed to a certain quantity of impure matter retained in the body, and they are persuaded, that this only circumstance, together with not being treated or cured by that which they call the best method, is an infallible sign of an imperfect cure; and for some small pimples, flea-biting, and the like, they will have the patient to undergo another course of salivation; and, not being able even by this to bring forth the imaginary impurity, they so drain the body of its natural humours, or so much alter the nature of the solid parts, that the patient dies in a little time, or becomes hectic and consumptive."*

Previous to inquiry into the effects of some of the numerous remedies employed in the cure of syphilis, it is proper to direct our attention to the opinions of those who hold that it has undergone great changes in its nature since the end of the fifteenth century. It may be that such an alteration has been produced in it either from the effects of remedies, or by natural causes, as seriously to influence the results of our treatment at the present day. The analogy of leprosy and of scurvy, which at one time raged throughout Europe, but are now almost unknown, is strongly in favour of the supposition of a change of character in

* "The Art of Curing Venereal Diseases explained by natural and mechanical Principles." English Translation of 1707, part iii. chap. ii.

syphilis; we have also direct testimony which shows that its symptoms have become milder and more tractable.

No author is better entitled to speak on the disease than the well known German Ulrich de Hutten, if personal suffering can confer such a melancholy distinction. After having suffered for nine years under it, and we may naturally suppose studied its history minutely, he tells us in his work published in 1519,* that for the first seven years after its appearance in Germany it raged with the utmost violence, but that when he wrote, its virulence had considerably abated. In 1563, upwards of forty years afterwards, Benardinus Tomitanus of Padua,† after noting some changes of symptoms which had taken place in the disease since its first appearance in Europe, bears strong testimony to its increasing mildness at the time he wrote. All the pleasures of social life, he says, had been poisoned by the breaking out of the *morbus gallicus*; in his time, however, men were less terrified, and no longer abstained from convivial intercourse with those affected; they began also to contract marriages without their former fears, and their inquiries were now influenced more by the amount of the dower they expected, than by the fear of pox. He then goes on to predict, that, in a short time, the disease would no longer be communicable by coition, as it had become old, and was hastening to decay.

The learned and indefatigable Astruc has collected the authorities of various physicians and historians to the same effect, including a period from 1546 down to 1711, to which he adds his own testimony, dated 1735. In it he says, "I have, by careful and repeated observation, found the venereal disease daily grow milder; it may, perhaps, be more frequently contracted than formerly, yet its rage is less violent, its symptoms are not so many, so painful, nor so difficult to be cured; it yields more readily to remedies properly applied, and, in a word, seems by little and little to approach towards its close."‡

Previous to the employment of mercury, and while the physicians of the day were struck with horror at the suddenness and violence of the disease, a mode of cure, denominated the "Rational" or "Methodical," was adopted. First, they bled, if the strength of the patient admitted of it; they then purged, and afterwards, to carry off the foul humours, they administered decoctions of various emollient and medicinal herbs; after which they purged again. The eruptions were anointed with unguents, emollient, desiccative, or anodyne, according to circumstances, and the diet was strictly abstemious. In short, they endeavoured to alleviate urgent symptoms, without any view to

* *Apud Luisinum*, tom. i. p. 278. Leyden edition of 1728.

† *Ibid*, tom. ii. p. 1015, &c. lib. ii. cap. 1 and 2.

‡ *Astruc*. lib. i. cap. 13.

a specific remedy. Their success was at first indifferent, but still it is clear that many must have recovered, otherwise Europe would have been depopulated.* Whether we suppose that the disease was transplanted by Columbus, or that it existed long before, either supposition is equally favourable to its having been cured without mercury; that remedy was unknown in the new world, and it was unemployed in the old, except locally, against vermin, itch, &c.

At length mercury was introduced as a constitutional remedy in the cure of syphilis also, whether by Berengarius Carpensis, or John de Vigo is undetermined, but it is certain that both these persons made their fortunes by the practice. It had previously been used locally in various forms. Thus in the work of Natalis Montesaurus of Verona, "De Dispositionibus quas vulgares mal franzozo appellant," published in 1498, the author, after describing the internal medicines and diet to be employed in conformity to his first and second indications, or the evacuation of humours, and the attention to the non-naturals, then proceeds to the third, or the selection of local remedies. If the itching was severe, he recommends ointments with the lees of wine, myrrh, litharge, ceruss, tutty, pipe-clay, sulphur, &c. If that symptom was not very urgent, he advises common oil and hog's lard. He then goes on to say, "Et in corporibus duris possumus addere viride aeris, maxime ubi intendimus remotionem malae carnis, et in quibusdam, argentum vivum sublimatum, nonnulli autem ponunt cum praedictis rebus argentum vivum, quoniam extinguit pruritum, quod nobis non placet."[†]

After mercury had been introduced as a constitutional remedy, it was so grossly abused, that numbers died under its effects. It must not be supposed, however, that these detestable abuses were universal. Some physicians, although they reprobated it

* From some extracts from the rare volume of Ruy Diaz de Isla, "Contra las Bubas," Salamanca, 155—, with which Dr. Thomson, professor of military surgery, has favoured me, I find that, in no town in Europe of 100 inhabitants were there fewer deaths than 10 on the first appearance of syphilis among them. Now, if we recollect that the numerous monks and nuns spread the disease through all classes of society, it is not an extravagant calculation that fifty out of the hundred were poxed. This will give us one death in five: the remaining four survivors must have owed their lives to the "Methodical or Rational" cure. I doubt whether the mortality was greatly less than this while the gross abuses of mercury prevailed under the form of daubings, with 4lb. of quicksilver to 2lb. of lard, applied over the whole body. "Cum quo," says Torrella, "infinitos, interfecerunt.—interficiuntur homines, non moriuntur." (Luisin, tom. i. p. 528.) But putting the mortality out of the question, Hutten expressly states, that hardly one in one hundred was perfectly cured, the disease returning upon them as it did on himself after eleven saliations. (See Ulrichus de Hutten de Morbo Gallico apud Luisinum, cap. iv. tom. i. p. 281 and 283;) but after guaiacum was introduced, only one individual died in Germany while under its use, and his death was attributed to excess in venery.

† Apud Luisinum, tom. i. p. 120

in excess, still employed it in small quantities. Among these was Gaspar Torrella, a Spaniard, Bishop of St. Justa in Sardinia, and physician to Pope Alexander VI. the infamous father of the equally infamous Cæsar Borgia. The earliest edition of his work is dated in 1497. One of his ointments contained a twentieth, and one only a fortieth of quicksilver, extinguished in saliva; yet even in this limited quantity he did not always prescribe it, but preferred the methodical cure, by which means, without the smallest assistance from mercury, he asserts that he cured several patients of severe poxes. With one of his vegetable remedies his success was remarkable, and his cures were not followed by secondary symptoms, as he expressly states to us; it consisted of the juices of bugloss, endive, hops, borage, fennel, and parsley, each four ounces, in which were infused for a day, half an ounce of senna, two drachms of polypody and aniseed, a drachm of turpith, and half a drachm of cinnamon; it was then boiled down to one half. "He calls it, "Syrupus mirabilis et expertus, cum quo innumerabiles non solum curavi, verum etiam praeservavi ab omnibus defecationibus cutaneis et doloribus panniculorum, lacertorum et nervorum."*

But Torrella did not confine himself to any one particular set of remedies; he sometimes used one and sometimes another, and even conceived, that, under judicious treatment, the patient might recover, whatever medicine was employed. This opinion is very fully expressed in his "Dialogus de dolore in Pudendagra."[†] The dialogue is supposed to be held between a physician and one of the vulgar; the passage is as follows: VULGUS.—"Multa et varia remedia scripsisti, dic mihi expertiora." MEDICUS.—"Omnia sunt experta, si sciveris ea applicare loco, et tempore." VULGUS.—"Potest à nobis hic morbus extirpari." MEDICUS.—"Potest cum auxilio tamen omnipotentis Dei, ae glorioissimae Virginis Mariae, matris ejus." His plan for effecting the extirpation, is to take up all the infected prostitutes, place them under strict control, and cure them, before sending them back on the town. Considering the age in which he lived, and how much it was his interest to shield the monks from suspicion, by inculcating the doctrine of the disease being communicable by the air, this avowal does him great credit. Astruc, who takes many opportunities of undervaluing Torrella, laughs at his scheme as Utopian. The truth is, Torrella's *speculations on the origin* of the disease differed from those so ably supported by Astruc; he therefore attempts to impeach his veracity, although he quotes and makes deductions from many of his *practical* facts; but these doubts of Torrella's truth appear to me to be founded on two very insufficient rea-

* Luisinus, tom. i. p. 499

† Id. tom. i. p. 518.

sons, viz. his exorbitant praises of such a villain as Cæsar Borgia, and the nature of his ecclesiastical employments, which he confesses occupied his time for ten years. Now as Torrella published, according to Astruc himself, in 1497, it is clear that the first six of these ten years had passed away before syphilis was known; and, besides, Torella mentions his ecclesiastical duties, in his observations to his patron, just as a modern author excuses any imperfection in his work. With regard to the first charge, the same excuse may be offered—he was a bishop addressing an all-powerful patron; but the corroboration his assertions meet with from facts under our own eyes, sufficiently justify our placing confidence in his assertions, even did no contemporary support them. This, however, is not the case. Anthony Benivenius, of Florence, who died in 1502, in his work “*De Abditis morborum causis*,” after enumerating blood-letting, sudorifics, purgatives, and medicated drinks, together with various external applications, mercurials among them, states, that instances are not wanting of patients who are cured by drinks containing the decoctions of lac, aloes, and myrtle.* Wendeline Hock,† who wrote about the same time as Benivenius, speaks of his cures by nearly the same remedies; but when the symptoms were so severe as to resist them, then he had recourse to mercury, but with great caution, “*propter discordiam et controversiam inter doctores*.” This practitioner says, that though he had cured many by mercury, yet he had known the pains of the limbs return afterwards more severely than ever—a fact in which he is most completely borne out by every day experience.

From these extracts, which I might easily multiply, from the rich mine of information preserved for us in the “*Aphrodisiacus*,” we see that the “*Rational and Methodical*” cure continued to have its advocates long after the powers of mercury were known, and while they were by several physicians limited within judicious bounds. But the frequent occurrence of fatal accidents among quacks, and imprudent regular practitioners, from overdosing that remedy, opened the road for a very favourable reception of guaiacum in Spain, in 1508, and in Italy in 1517, whence it was generally introduced into all parts of Europe.

It would be a waste of time to enter into an account of the cures performed by guaiacum; if we may place any confidence in human testimony, we must admit of the fact; for there is not one point in physic on which the assertions of authors from Deldago to Boerhaave,—a space of two hundred years, have been stronger and less contradictory. On its first introduction, in-

* Luisin. tom. i. p. 402.

† Ib. tom. i. p. 338

deed, it was despised, and its powers denied. Thus, Brassavolus says, that he was the first who administered it to Eneas Pius, in 1526. It was looked upon by all the other physicians as a new and unheard-of remedy, and a great many laughed at it till they saw that illustrious gentleman restored to health by it.* Its price, which was at first enormous,† must have limited its employment to the rich, while other classes of society still continued to employ either the methodical or the mercurial mode. To obviate the expense, the same wood was often subjected to decoction, but at length it was imported in such quantities, that it got into common use. Three thousand Spaniards are reported by Nicholas Poll to have been cured by it at one time; and, in short, all over the continent of Europe, multiplied examples of its efficacy were to be found. It is quite impossible, at this distance of time, to discover the precise nature of the diseases of which these patients were relieved. We may admit that many of them laboured under symptoms which might have been removed by diet, regimen, and cleanliness, without any medicine; we may also admit, that, as in the cases of ulcerations of the genitals, and in the cutaneous eruptions which succeed them, with which we are familiar at the present day, some were not truly syphilitic; but, to suppose that among the entire number cured, *none* were so, is an assumption perfectly gratuitous, and, (considering some of the authorities,) I might be justified in saying ridiculous. "I remember," says the most scrupulously correct of all reporters, the illustrious Morgagni, "I remember when I was quite a young man, and went to Bologna, that both methods (external and internal) of using mercury were so far deserted, that I never saw any physician make use of it, or even heard of his using it, for the whole space of *eight years*, during which I studied physic there, in either one way or the other way.‡ What remedies, then, have you seen those very excel-

* Lusin. tom. i. p. 706.

† Eleven golden crowns an ounce, according to Nicholas Massa.

‡ Epist. 58, art. 16. In England an attempt was made many years before, to prove the possibility of curing the disease without the employment of mercury in most cases, and without producing its effects as a silagogue, in any. Of the work I know nothing, except from the Bibliotheca of Haller, and from the very imperfect account given of it in the year it was published, in the Philosophical Transactions, anno 1684, No. 150, vol. xiv. It is entitled "Tuta ac Efficax Luis Venereæ saepe absque Mercurio, ac semper absque salivatione mercuriali Curanda Methodus;—authorc, Davide Abercromby, M. D. 12mo, Londini, 1684. It was translated into French by St. Romain, in 1690. The practice seems never to have gained ground, and the book remained long neglected. From the days of Clowes, the mercurial practice was in full vigour in this country; he is the earliest English writer on Syphilis, and published, anno 1575, "A New and Approved Treatise concerning the Cure of the French Pockes, by the Unctions," 8vo, London. Astruc refers to a manuscript in the Sloanian Library, of the still earlier date of 1572. I have seen a small 12mo. volume by R. Bunworth, dated London, 1662, in which he speaks fami-

lent physicians make use of, you will say, against the Lues Venerea? Why, the decoction of the woods," &c. In this interesting article, Morgagni, after mentioning that different methods of cure have been used by different persons, and that what had formerly been in vogue was often deserted, and that which had been exploded substituted in its stead, concludes by saying, that from the time he resided at Bologna, to the period at which he wrote, a period of fifty-four years, mercury was again brought into use, as an anti-venereal remedy, in that city.

A few very plain questions arise, on this assertion of Morgagni:—Could the whole of the medical profession of Bologna have been for eight years blind to the injuries inflicted on their patients by the want of mercury? or, could they have been blind to those entailed on their offspring, had such untoward events occurred? Is it possible that there was a suspension of the symptoms of true syphilis, for eight entire years, exclusively in the city of Bologna? Admitting, however, that some of the cases cured without mercury were not really syphilitic, and that the physicians were deceived, is it to be supposed that they were deceived in them all? It would assuredly be somewhat unfair to the Italian physicians, and rather flattering to ourselves, to suppose that they were deceived by what occurred before their own eyes in 1720, and that we, in 1820, know much better the real state of their patients than they did themselves. What, then, it may be asked, made the physicians of Bologna revert to the use of mercury, after an interval of fifty years? The reply which I should make to this, would be comprised in the following question and its answer:—What has occasioned all the revolutions in physic, from the foundation of the science to the present hour?—A fashion, founded in some degree on truth, but in a great degree, also, on the combined causes of imitation, habit, and adaptation to local circumstances, the adoption of which, was not productive of such fatal events as would justify a violent and universal rejection of it, but which left to the physician the consciousness of having treated his patient according to the plans of his contemporaries, and thereby exonerated him from all blame under the occurrence of any sinister event. Nothing, I may here observe, can be easier than for persons at a distance of either time or place to point out omissions, or discrepancies, or unsatisfactory details, in any one written case of physic, and thus, if they are so inclined, propose almost insurmountable obstacles to the settlement of points for the elucidation of which details

liarly of *nine* different modes of curing syphilis, five of which are without mercury. One of these last, he says, "is the only way for those that have sharp and eating humours, insomuch that they are fearful of losing the palate of their mouth, or the bridge of their nose, and have holes in their head, or any other part." pp. 38, 39.

of cases are required: but if a case possesses a majority of those characters admitted by general consent to constitute a particular disease, it is altogether frivolous, to make objections at a period when a re-examination cannot be instituted. For instance, is it not presumptuous to insinuate, that Drs. Rutherford, or Currie, or Rollo, or any other eminent physician, could not decide on the genuine character of a chancre before their eyes, but that Drs. A. or B. or C. at a distance of some hundred miles from them, could do so at once? If, indeed, the character of the narrators is doubtful, their assertions contradictory, and their conclusions absurd, then we may hesitate, and give to their opinions and cases that value only which they appear to deserve.

It would be a matter of vast importance did we possess any work on the comparative merits of the treatment by guaiacum and other woods, and that by mercury; none with which I am acquainted exists upon the subject, but we may collect some detached observations on consulting the works of those who speak on both methods. Thus, Gabriel Fallopius, in his 96th chapter, *De Ossium Corruptione*,* speaking of the loss of the bones of the nose and palate, says, “*Et sciatis quod non in omni inven-terato gallico hoc fit, sed tantum in illis in quibus inunctio facta est cum hydrargyro.*” Fernelius, who appears to have had great opportunities of witnessing the treatment of syphilis by mercury, though certainly at a time when it was pushed beyond all reasonable bounds, in his 6th chapter, describing the great injuries sustained by the mercurial cure and the frequency of relapses, observes, “*Recidiva raro similis est radici, neque iisdem symptomatis exercet, sed fere distillatione, arthritide tophis vel ossium carie.*”† But his scholar, Julian Palmarius, is still more pointed, and institutes a comparison between the two practices, in his work *De Morbis Contagiosis*, published at Paris in 1578.‡ He there, speaking of the affection of the bones, uses the following remarkable words: “*Sed hoc iis duntaxat contingit, qui olim a lue venerea hydrargyrosi vindicati putarentur, non qui decocto guaiacino et alexipharmacō curati fuisse.*” This opinion, with regard to the diseased state of the bones being the consequence of mercury, was generally adopted all over Germany. When we reflect that mercury is soluble in the albumen of the blood, and has often been detected in it in persons who have undergone long courses of the mineral, we must be convinced of its very powerful and protracted influence. I shall not enter into the inquiry, whether it has ever been found existing in the cancelli of the bones in its metallic form in exa-

* Luisin. tom. ii. p. 827.

† Joannis Fernelii, *De Luis Venerex Curatione*, Apud Gruner.—*Aphrodisiacus*, vol. iii. p. 146.

‡ Cap. 7, Lib. 2, p. 124.

minations of the dead body; but we know for a fact, that the bones of those who have undergone long mercurial courses, never make such white or elegant skeletons as others.* It becomes a point well worthy of inquiry, whether mercury produces diseases of the bones where a predisposition to these diseases does not exist. I am well convinced that the carious affections of the bones, which are so common in persons treated by long mercurial courses, have proceeded, not from the disease, but from the remedy rapidly and irregularly thrown in while periostitis existed: as a proof of which, I have not seen a single case of carious bone in the military hospitals since the non-mercurial treatment was adopted, except where mercury had formerly been used,—so that those gentlemen who so kindly and compassionately harangued on falling noses and rotten bones, have displayed their sensibility in vain.

It would be a most laborious task to inquire into the comparative merits of all the medicines or plans which succeeded to guaiacum in the cure of the venereal disease; they have amounted to many hundreds. Some of them have been powerful, as the acids, opium, sudorifics, blood-letting, purging, &c.; others have been quite inert, as box-wood, balsam of sulphur, calamus aromaticus, &c.; some of them ridiculous, as burying the patient in horse or human dung; and others immoral, as coition with a sound person; but it is very remarkable, that there is no one remedy which has ever been proposed or used, which has not frequently succeeded in the cure; this can only be accounted for upon the supposition that the disease, in many instances, cures itself. Upon this principle, all empirical remedies which have contained the mild juices or extracts from plants, and which were said by their inventors to be powerful specifics, have probably appeared to be successful. There are too many instances of cures having taken place while patients have been using such remedies, to deny the fact, although we may not admit the conclusion, that the cures were produced by the use of the remedy.

The observation of Leo Africanus is particularly worthy of attention; it is to be found in his work, entitled, “*Joannis Leonis Africani, Africæ Descriptio.*” Lugd. Batav. 1632, p. 86; it is also quoted by Mr. Pearson in his introduction to his *Observations on the Effects of various Articles in the cure of Lues Venerea, &c.* (he refers to an older edition than mine, viz. that of Antwerp, 1556, fol. 33.) In this passage, Leo very positively asserts that the disease undergoes a cure by change of climate in Africa, spontaneous, and without the employment of mercury. This assertion, which has been laughed at, is most re-

* Leber's Anatomy, article, “*Color Naturalis Ossium.*” Monro, in his Anatomy, mentions molities ossium as having succeeded to a course of mercury. See also a case of Mr. Carpuc's alluded to at p. 284 of this work.

markably confirmed by a modern traveller, Horneman, speaking of the people of Fezzan, a kingdom in the very centre of Africa, says, "There are various sorts of venereal disorders prevalent in Fezzan,—that imported from Soudan is the worst. The common lues venerea, brought from Tripoli and Cairo, is called Franzi, or the Frank evil. For the cure of either species they use salts, and the fruit candal (colocynth) as powerful cathartics, and the sores, if any, are at the same time washed with natron water, or dissolved soda. These remedies seldom fail, unless the disease has taken a very deep root." Horneman's Travels from Cairo to Mourzouck, 4to. London, 1802, p. 63. In a subsequent letter he confirms the authenticity of his former report. I apprehend little specific power will be attributed to the purgatives and the alkali, but we have some interesting European and American confirmation of this African practice, as it regards the external application of the alkalies, (not to mention Peyrilhe's testimonies of their effects when used internally.) Dr. Mitchell of New York, in the Medical Repository for 1799, assures us, that a great number of venereal ulcers were cured in the hospitals of that city by the local application of potash or salt of tartar, from which fact he draws the very natural conclusion that neither nitrous acid nor mercury produced any *specific* effect upon these ulcers.* In Scotland, soda has been used for the same purpose with no small success by Dr. Andrew Ferguson, of Aberdeen, in the form of a solution, of one ounce of the sulphat dissolved in four pounds of boiling water, and applied by the medium of a cold poultice, a full account of which practice is to be seen in the Medical and Physical Journal, vol. x. p. 499. And although the author was not aware of the full extent to which his practice might have been pushed, or of all the conclusions which might be deduced from it, he is entitled to much credit as a faithful observer and judicious practitioner, and his report very remarkably confirms the observations of preceding and later authors.

The domestic medicine of the American Indians and other nations may be inquired into advantageously for proofs of a spontaneous cure; the fact that they often apply for advice and for mercury to European surgeons, militates very little against the authenticity of cures by their own indigenous plants; for the multiplication of remedies against disease is a propensity natural to man, in both his savage and his civilized states. I shall not enter farther into the inquiry of the spontaneous cure of this disease, but shall refer to the works of Tomitanus, Fracasto-

* Some of our troops, during the last war, served at Ceuta, on the coast of Africa. Dr. French, assistant-surgeon to the forces, who was quartered at that place, informs me, that the Moors seldom think of using mercury for syphilis, but trust its cure entirely to cleanliness and native herbs. In some of the maritime towns mercury is used by those who have visited the European ports.

rius, Blegny, De Hery, Fernelius, Ramazzini, Van Swieten, and Vercellonus, among the writers of older date; and to Lagneau, but especially to Vacca Berlinghieri, among the moderns.

In collecting materials for the history of the symptoms of the venereal disease under the mercurial regime, we have to separate the effects of the complaint from the effects of the remedy;—we should not take these from the exaggerated accounts of interested men, but select them from the ordinary results of mercurial courses. The situation in which gilders and other artists are placed, and also that of the unfortunate beings who dig quicksilver from the mines, are extreme and complicated cases; but from the facts presented to us, under more ordinary circumstances, it is established that scrofulous habits are peculiarly liable to suffer during the employment of mercury,—that the phthisical tendency is greatly aggravated and often evolved by it,*—that profuse hemorrhages from the lungs are frequently produced by it†—that it gives rise to the most aggravated and distressing forms of dyspepsia,—that dropsy and affections of the urinary organs are often produced by its abuse,—that although a powerful remedy in hepatic disease, it often gives rise to jaundice, (indeed, in diseases of the liver this remedy is often grossly abused,)—that it produces very irregular states of the bowels,—that its effects on the nervous system are often extremely severe and complicated, appearing under the forms of pain in the head, insomnolency, and that state of disease termed, by Mr. Pearson, Erethismus, affecting the brain, heart, lungs, and diaphragm, and indicated by pains, skrinking, and peculiar appearance of distress in the countenance, anxiety, partial or universal trembling, palpitation of the heart, sighing, and difficult respiration, and not unfrequently by sudden death on an attempt to move,—that the maniacal tendency is particularly aggravated by it. In some instances, different members of the same family have become furious during mercurial courses; nor has it been in the instance

* In Dr. Prout's paper in Thomson's "Annals of Philosophy," 1814, it is stated that the formation of carbonic acid in the lungs is diminished by the use of mercury.

† Scarpa states, that persons who have had *lucus venera* are particularly predisposed to ulceration and disorganization of their arteries. Is this the effect of mercury? See a case in this work, p. 160. With regard to the effects of mercury on the pulmonary system, I have been always struck with the following experiment performed by Clayton, so far back as the year 1694, and detailed in the *Philosophical Transactions* for that year, p. 121. It is also quoted by Dr. Saunders, in his admirable work on *Diseases of the Liver*, 3d edition, p. 307. Two drachms of crude mercury were injected into the crural vein of a dog. On the second day there were obvious symptoms of fever; in two or three days more, dyspnoea supervened, followed by cough, and a daily increasing affection of the lungs, until the animal died. On examination, his lungs were found in a tubercular state, many of the tubercles had suppurated, and formed vomicæ, and on making sections into them, each contained a globule of mercury forming a kind of nucleus to the circumscribed inflammation.

of mania alone that the family disposition to be injured has manifested itself; in many instances there seems to be an hereditary constitution with which it uniformly disagrees, producing all its most violent effects, and under no mode of management, nor in any prudent quantity exciting ptyalism, or any beneficial effect on external sores. In gouty habits a very small portion of mercury often excites the disease; but the most troublesome and most common of all its effects is the phagedænic ulceration, which it often induces both in chancres and open buboes, and the disposition to fresh ulcerations of a spreading and intractable character which it gives rise to in parts where the skin had not been previously broken. In the throat most severe ulcerations are excited by it, erosions of the gums and palate are produced, and the popular and other eruptions of the skin, which so often appear as a secondary form of disease, are frequently exasperated into open ulcerations. I have not seen a single case of ulceration succeeding to a cutaneous eruption in the military hospitals since the non-mercurial practice has been adopted, except where mercury had been long and irregularly used.*

From the various ill effects of the medicine, prudent physicians have at all times been cautious, and intermitted its use, sending their patients to the-sea shore, or to the country, in order to recover their constitutions, and to be thus enabled to try it again; by these means enormous quantities have been introduced. Sometimes the constitution has resisted, but much oftener it has sunk. Hence, we will invariably find, that where most mercury has been used, there has the mortality been greatest; not, I apprehend, that the poxes were most severe, but that the specific was administered in the largest quantities. Many practitioners, in order to avoid these inconveniences, have com-

* A curious instance of the effects of mercury is alluded to in the 6th volume of the Edinburgh Med. and Surg. Journal, p. 513, and is the most unmixed case that can possibly be imagined. Several boxes containing leather bags filled with quicksilver were brought up from the wreck of a Spanish vessel at Cadiz, and stowed on board some of our ships of war; the bags rotted, and the fluid mercury penetrated through all parts of the ship, and was even mixed in minute particles with the bread and other provisions; a general salivation took place, the domestic animals, even, I believe, the fowls and birds were affected, and every rat, mouse, and cockroach on board died. I saw several of the officers and crew of the Triumph at Gibraltar in 1810, many of whom, I understood, had a most narrow escape with their lives, and some that I examined had severe febrile exacerbations, swellings, and ulcerations of the tongue, ulcers of the throat, enlargement of the submaxillary and cervical glands, erythematous affections of the skin, various nervous affections, and severe pains in the bones and joints, and in the muscular parts of their limbs. The surgeon of the Triumph was so kind as to show me the cases at the time, but my notes of them are lost. A report on the subject by that gentleman would be most valuable; few such opportunities will ever occur for observation so extensive on individuals in perfect health, and under their usual mode of living. A detail has been published since the date of this note by Dr. Burnet. See Johnson's Medico-Chirurgical Review, for March 1824, p. 1010.

oined the tonic and the mercurial plans, and have given the mercurial oxyds in combination with decoction of cinchona. This has been thought a very superior mode of treatment, and I believe it to be a very useful one; not that the patient is by it enabled to take more mercury, but that he actually takes less; for the chemical discoveries of Berthollet show us, that the astringent principle of vegetables, particularly of the cinchona, decomposes the mercurial, as well as the antimonial, oxyds, and of course renders them inert.

Some physicians have been very anxious to call into action the *dormant* venereal virus, so as to render it more tangible to future courses of mercury. Mr. Swediaur has taken much pains on this subject. In the minutes of the proceedings of the "Medical Society of Brussels," he gives an account of some experiments, made with a view to this purpose. The symptoms he observes, often entirely disappear, under the employment of mercury, yet the patient still remains uncured. As a remedy capable of renewing the activity of the virus, he recommends the preparations of iron.* Are not the effects of this medicine rather to be considered as those of a tonic, during the employment of which the mercurial cachexy gets time to subside? and is not the reiteration of a mercurial course much more likely to destroy than to restore the constitution of the patient?

While I have thus enumerated many of the ill effects produced by mercury when it acts as a poison, I must give my strongest testimony to the admirable results which proceed from its judicious use in persons not constitutionally disposed to be injured by it, and who do not lead profligate lives, or are not exposed to the foul air of hospitals fully saturated with its fumes. In common with other physicians, I have, however, frequently observed that mercury, like many other substances with which we are familiarly acquainted, frequently mitigates in small doses, but without effectually removing, many of the symptoms which it has occasioned when very largely used, a property which has often led to serious mistakes,† and which must detract considerably from the value of any examples drawn from the cases of those whose constitutions have been constantly charged with the mineral, when such cases are brought forward as unquestionable proofs of its efficacy, where syphilis has resisted every other means of cure. I would by no means, however, be understood to assert, that many cases have not yielded to mercury, which had previously resisted every other medicine. Of its unquestionable efficacy there can be no doubt; but its indiscriminate employment in every case, whether old or recent, suspicious,

* Proceedings of September 27, 1797. The Black Oxyd is the preparation recommended, "Actes de la Société de Med., &c. a Bruxelles," tome i.

† See Matthias.

or confirmed, and without any view to the patient's diet, or his general health, has produced the most dreadful consequences. To reduce its employment within the limits where it can be salutary only, without creating or evolving other diseases, is the best means of supporting the reputation of the medicine. Where Hunter and Abernethy, Pearson and Carmichael, have hesitated, we surely may be permitted to pause. These eminent men greatly contributed to the elucidation of the circumstances under which mercury was improper; their precepts and their example have reduced the quantity formerly given to comparatively moderate bounds; but it remained for the inquiry, which is at present prosecuting in the military hospitals, to show, that even these bounds are too extensive, and that the practitioner has, in a vast number of instances, the option whether to defer its use, to limit it, or to omit it altogether. Settled as it now is, beyond a doubt, that syphilis does not run on uninterruptedly to a fatal event if not checked by mercury, that practitioner cannot be admitted to do full justice to his patient, who does not avail himself of the fact;—to his own judgment must be left the extent to which he may be pleased to do so.

It is impossible for me to mention the revered name of Hunter, without pausing for a moment to speak of the man. That he was a powerful and original genius, an enthusiastic investigator of truth, and the possessor of an acute and almost peculiar tact, as an anatomist and an experimenter, is universally allowed. But, like every other being of finite endowments, he had his deficiencies and his errors; the errors of a daring, a strong, and an original mind, and always more observable in his speculations than in his investigations—in his theory than in his facts. His language has been, in many instances, but very remarkably in his Treatise on the Venereal Disease, confused, and not seldom unintelligible;—a confusion and obscurity which may often be traced to the erroneous point of view in which he saw a subject, and on which he has dwelt the longer, the more he was in the wrong, endeavouring to reconcile himself and his readers by a multiplicity of words, to speculative points which no language, however pure, could explain, and no reasoning, however ingenious, could elucidate. Truth was, in the mouth of Mr. Hunter, always simple, beautiful, and impressive; our veneration for the man has alone permitted the attempts to veil or disfigure it to exist for a season uncontroverted. To his successors in error, however, who possess a double portion of his perplexity, without one ray of his genius, we owe no such deference; and in truth, he has sustained through such persons, bloated as they are with borrowed importance, more than his just proportion of blame. Upon the whole, perhaps the most serious practical fault of this great man was the confidence which

he placed in the mercurial diagnosis, or that which leads us to suppose, that because a sore or a symptom has yielded to mercury, the disease must have been necessarily syphilitic. By this exclusive rule we can never positively determine what a sore or a secondary symptom actually *is*, but must decide upon its nature by what it *has been*,—a retrospective mode of reasoning, far from satisfactory, and founded upon an assumption, the truth of which is more than problematic.

Though the important facts recently established require no authorities or analogies for their support, it is pleasing and instructive to find them mutually corroborated and corroborating; it is delightful to show, that the assertions of physicians, travellers, and historians, which formerly were deemed fabulous, or at best doubtful, may now be considered as fully entitled to belief, and that those who advanced them were neither deceived themselves, nor wilfully deceived others. But while we pay this just tribute to the veracity of these persons, it should not be forgotten that it is to their successors we owe the power of doing so. The investigations carried on under the sanction of the Director-General of the Medical Department of the army, have done more in three years towards the elucidation of the natural history of syphilis, than had been effected for three centuries before. Previous to these investigations, the admirable work of Mr. Pearson afforded the best account in the English language of the different modes of treating syphilis, and of the comparative powers of the remedies employed. In France, the able “*Parallèle*” of M. Louis was of equal authority. Did my confidence in Mr. Pearson’s conclusions depend solely upon respect for the talents and learning of that author, or on a perfect conviction of his desire to decide impartially on the evidence *then* before him, it would have remained unshaken still; but circumstances of recent date, which could not have been known to him when he composed his work, appear to me to call for a reconsideration of the whole subject.

I shall not degrade myself by entering into disputes with those who have sheltered themselves behind the lecturer’s chair, from whence they have poured forth abuse against the army surgeons, as unmanly as it was unmerited. I little envy that man his feelings, who dares to utter such a calumny against the army surgeons, as that they could for one moment entertain the idea of abusing the power placed in their hands: and his head must be very weak, who does not see, that the most suitable return to the government for all the public money laid out on the hospitals, and to the individuals of the army for that portion which they pay to the support of these establishments, is to investigate carefully and honestly the best means of treating diseases, and thus to curtail the expenses both of the individual and the com-

munity. Did the officers of the medical department of the army, under their most enlightened and active Director, prefer their own ease and convenience to the benefit of science, mercury was at hand to cover their apathy; and even the few facts which the present inquiry has brought to light might have gone down to oblivion, with the hundreds of thousands of other facts, which in the course of three centuries, have been confounded or totally lost, by a blind, non-discriminating, and often fatal confidence, in the powers of *one remedy alone*, to the exclusion of every other resource of art.

In the practical remarks which I am now about to make, I propose to embody the whole of the information that I have been able to collect in the various military hospitals under my superintendence for the last four years, as well as from the latest official documents which have been promulgated to the army by the Medical Board, and of which, by the liberality of Sir James M'Grigor, I am permitted to avail myself. But before I enter upon this subject, in order to avoid all possibility of misconception or misrepresentation, I feel it incumbent upon me again clearly and distinctly to avow, that I entertain no doubt of the utility of mercury, when properly employed as an auxiliary in the treatment of venereal complaints, especially when they become chronic; but while I admit this, I am equally confident that the disease, like many other diseases, is susceptible of a spontaneous cure in many cases; that in many others it is curable without the employment of mercury, either externally or internally; and that where mercury is employed, the doses may be greatly diminished from what was lately supposed necessary, and that its effects may be always limited to a moderate irritation of the gums, so as that the poisonous effects of the remedy may be as much as possible avoided. Having premised thus much, it is also necessary that I should say, that, convinced though I am of the possibility and facility of the non-mercurial cure, I am by no means authorized from my experience to assume, that its *eligibility*, in *every* case, or under *all* circumstances, is yet established. How far the observations I have to offer may tend towards this end, it will be for the reader to judge, and for farther experience to determine. All theories, or pre-conceived opinions on the subject formed in the closet, and promulgated by *talking* physicians and philosophers, if unsupported by actual experiment, I look upon as perfectly worthless. No man could have been more firmly convinced than I was five years ago, of the extravagance of supposing that this disease could, under any circumstances, be cured without mercury, (to which alone I had trusted in at least a thousand cases,) until conviction was forced upon me by repeated observation, confirmed by an attentive consideration of the testimonies of the best informed practical

writers of past times, and the opinions, both oral and written, of those of the present, whose opportunities have been such as to entitle their opinions to any weight on a practical subject.

It is painful to confess that we are not in possession of the knowledge of any invariable characteristic symptoms, by which to discriminate the real nature of the primary sore, and we are equally at a loss in many of the secondary symptoms. I am well aware that some practitioners have assumed to themselves the possession of a “*tactus eruditus*,” by which they can at once distinguish a chancre, or a venereal ulcer or eruption, in which mercury is indispensable, from one of a different nature, but I have seen too many instances of self-deception to give them all the credit that they lay claim to. It would be by no means difficult to show that the high round edge,—the scooped or excavated sore,—the preceding pimple,—the loss of substance,—the hardened base and edge whether circumscribed or diffused, and the tenaciously adhesive discharge of a very fetid odour, are all observable in certain states and varieties of sores unconnected with a venereal origin. The hardened edge and base, particularly, can be produced artificially by the application of escharotics to the glans or penis of a sound person, and if any ulceration, or warty excrescence, previously exists on these parts, this effect is still more easily produced.

What, then, it may be asked, would I recommend as the proper treatment of the diseases produced by sexual intercourse? I shall endeavour candidly and conscientiously to answer the question.

1st, In every primary ulcer I would give up the idea of using mercury at first, treating it as if it were a simple ulceration by cleanliness, rest, and abstinence, and applying to it the most simple and mildest dressings.* If the sore did not put on a healing appearance in a reasonable time, the extent of which must depend on the circumstances of the patient, I should make use of more active dressings. But if, beyond all calculation, it remained open, I should certainly not sacrifice every consideration to a dislike of mercury, knowing how many persons have been seriously benefited by a judicious and mild administration of that remedy. 2^d, The same principles which guide me in the primary ulcers, would have the same, if not the greater force, in the case of buboes. In their irritable state, I consider mercury as altogether inadmissible. Moderate pressure,† and cold applications, will often disperse them in their commencement, aided by Girtanner’s plan of frictions of volatile liniment

* A very early application of the lunar caustic will often supersede all other remedies.

† The spring truss is a very convenient instrument for applying the pressure.

on the thigh of the affected side.* If they suppurate, opening with the kali purum is by far the best plan; they then heal from the bottom. 3d, The cutaneous eruptions I would treat at first on the same general principle, but I should not very long postpone the employment of the mildest mercurial alteratives, aided by warm bathing and sudorifics. 4th, In the affections of the throat I would be more guarded than in any others in the employment of mercury, until all inflammatory disposition was removed; after that, I have seen them yield as if by magic, so soon as the local effects of the mercury on the parts within the mouth became obvious; but before the inflammatory symptoms were subdued, I have seen a vast number of instances where irremediable mischief has been done. 5th, In the bone cases during the stage of periostitis, or any approach towards it, local bleeding, blistering, warm-bathing, and abstinence, are the proper remedies to the entire exclusion of mercury. When inflammation is subdued, that remedy may be tried in moderation; but if caries exists, I hold it to be highly improper under any form.

So far has delay been from injurious in the cases which have come under my inspection, that I have invariably found the salutative powers of mercury most remarkably assisted by the previous preparation which the patients have undergone by minute attention to cleanliness, rest and rigid abstinence, and by the action of purgatives and sudorifics, or of venesection where it was found necessary. If, in any case, this was more conspicuous than in another, it has been where the ulcerations on the penis have been irritable and extensive, and almost threatening its destruction,† or where the throat has been severely affected. The extent of the period for which mercury is deferred must entirely depend on the circumstances of the patient; in delicate phthisical habits, we now know that there is no necessity for hurrying; at the same time, no person in private practice, whose constitution could tolerate mercury, would willingly continue to bear about his person those suspicious looking stains and eruptions on the skin which a judicious employment of that remedy so often relieves.

That the cure of some of the cases treated in the military hospitals under my superintendence would have been accelerated by the use of mercury, is extremely probable; but a mixed mode would obviously have left the trial without mercury, incomplete, and its success still dubious. Desirable, however, as it has been, to ascertain how far that powerful mineral may

* Blisters are often of great service where they remain in a torpid state.

† In hospitals where the atmosphere is strongly mercurialized this event very frequently occurs.

be dispensed with, in the cure of the disease for which it has been so long looked on as the sole specific, the point would have been left undecided, had its decision involved the constitutions of the patients, or compromised the characters of their medical attendants. In no case, I most firmly believe, has the health of an individual been wantonly trifled with, nor has the utmost professional exertion been spared, to elucidate the history of this most interesting and most common of all military diseases, even in the persons of some of the professional men themselves.

With regard to the mercurial preparations which have been locally applied, they were used to try how far they would accelerate the healing of the sores, or the removal of scaly eruptions, but never to such an extent as to affect the constitution; cold water has been long substituted in their place by many surgeons. Considering the extremely minute proportion of mercury they contained,* the observation that the cure was due to them, comes with peculiar ill grace from persons who declare that nothing but *full* courses of mercury can cure the disease; the same observation is applicable to any mercurial purgatives that may have been given with a view to their effects on the biliary organs; but that practice also is now generally given up. It has been supposed or at least very loudly asserted, that the cures affected *apparently* without mercury have been actually performed by means of the different preparations of the mineral, and by caustic surreptitiously employed. But the slightest acquaintance with the discipline of military hospitals, as at present conducted, would point out the impossibility of such a practice.

The first trials which I witnessed were made at Hilsea Hospital in the year 1816, and they were conducted under the eye of my able friend Dr. Knox, a gentleman peculiarly qualified for the task by professional zeal, sound judgment, and an intimate acquaintance with all that had been done or written upon the subject by his predecessors or his contemporaries. At that period, I supposed that the Hunterian chancre and its consequences were absolutely incurable without mercury; wherever, therefore, the characters of this species of sore were detected, no time was lost, and that medicine was at once administered in moderate quantity.† Of fifty-eight primary sores which occurred between the

* The black wash commonly employed in our hospitals contains one drachm of calomel to sixteen ounces of lime-water; certainly not more than the fourth part of an ounce is employed in the day, and it is not very extravagant arithmetic to calculate, that not a fortieth part of it is absorbed, even admitting that absorption takes place unaided by friction. The quantity of mercury, therefore, will probably not amount to the fortieth part of a grain daily.

† To prevent all cavilling about words, I understand by Hunterian chancre, true chancre, or true syphilitic ulcer, a sore answering the definition given by

1st of May and 24th of September, twenty-eight were cured without mercury, the remainder were considered as true chancres, and were treated accordingly. During this period we received into hospital ten secondary cases, chiefly foreigners from the Mediterranean, seven of these were cured by mercury; in the remaining three the secondary symptoms were distinctly traced to gonorrhœa, and were cured without the administration of that remedy. In one of the secondary cases we had a remarkable illustration of the fact, that they occur after a well regulated course of mercury, illustrating Mr. Hunter's doctrine, "that if the disposition to the disease is formed, mercury cannot cure it until it come into action;" which, in plain language, as Mr. Guthrie has well expressed, "means nothing more than that the disease cannot be prevented in certain constitutions from running its own course, when it may at last be cured." In the case alluded to, no quantity of mercury, in whatever form administered, could be made to affect the salivary glands; a quantity, however, was used, which was deemed sufficient to effect a radical cure; all the primary symptoms gave way, but some time after having left off the use of mercury, secondary symptoms appeared in the form of ulcerations in the throat; no more mercurial medicines were administered, and this symptom gradually disappeared of itself. Some of the non-Hunterian sores occurred in officers, the rapidity with which they healed under the wash of lime water and calomel was astonishing, but the patients were so much impressed with the fear of subsequent pox, that the assistant who attended them was obliged to supply them with pills supposed by them to be mercurial, but really composed of bread; no ill consequences followed this innocent deceit; but it is remarkable that in one of the patients the mouth became sore, partly from imagination, and partly perhaps from his frequent attempts to ascertain the effects of the remedy by pressure on his gums with his fingers and lips. Since this occurrence, I have had frequent opportunities of witnessing the same fact, particularly at the military hospital at Dover, under the care of my friend Staff-surgeon Macleod.

It was not till I took charge of the North British district in October, 1817, that I had an opportunity of verifying the reports which I had received of the practice in the Hunterian sores

Mr. Hunter in the first chapter of the fourth part of his treatise, edited by Dr. Adams, London, 1810, pp. 314, 326, and repeated by Mr. Carmichael, *Essay on the Venereal Diseases, &c.* p. 25. Although the eafious nature of the ulcer has been handed down from the earliest writers on the disease as characteristic, I use the term Hunterian, because the description by that eminent man is more generally known and read than that of the older writers, and is by some supposed to include every possible shade of sore capable of producing syphilis. See the authors in the collections of Luisinus and Gruner, and the work of Clowes; but particularly see Wiseman.

and its consequences, as followed by Messrs. Guthrie, Rose, Dease, and others in London, and by the medical officers of the army in France. On my arrival I found the practice adopted to a great extent in the hospital of the 88th regiment quartered in Edinburgh Castle, under the able care of Mr. Johnston, surgeon, and Dr. Bartlet, assistant-surgeon, gentlemen to whom I am greatly indebted for many interesting facts; and from whom I experienced every assistance which could be derived from men who, well informed themselves on this particular branch of their profession, were zealous without prejudice, and decisive without petulance. From Dr. Jones of the 40th regiment, who was, during the same period, quartered at Glasgow, I received equal information and equal support in my numerous visits to that city; other corps have come less under my notice, or have remained in Edinburgh or other stations for too short a period to admit of my having derived equal information and equal assistance from them, but of their abilities and inclination I can have no doubt. To speak of Staff-surgeon Thomson would be superfluous; the result of his practice in private, as well as in the military hospitals of Edinburgh, before I took charge of them, is already in the hands of the profession. I have had many opportunities of witnessing the justice of his remarks, and have seen him persevere in the non-mercurial treatment in the most unpromising cases, with results equally fortunate and unlooked for.

The appearances of the primary sores contracted by sexual intercourse, which have presented themselves in the military hospitals, have varied extremely, but in many instances they have been very much influenced by their particular position. The following circumstances have been principally remarked in them: *1st*, Ulcers on the external integuments have generally had round callous edges, level surfaces, but little induration of base; they were less irritable than others, became sooner clean, and healed uniformly, but slowly. *2d*, Ulcers on the internal membrane of the prepuce have been generally either superficial or elevated; their surfaces covered with a light coloured slough, or of a bright red, with villous appearance; their edges either regularly defined, or spread out like excoriations; their bases have been, in general, but little indurated, but when the ulcers have spread out, they have sometimes acquired a cartilaginous hardness, and have been extremely difficult to heal. *3d*, Ulcers immediately behind the corona glandis have been, in general, highly irritable, deep scooped, indurated in their edges and base, foul, with membranous bridles, running across them, throwing off a perceptible slough; but if mildly treated, soon healing after that event. *4th*, Ulcers on the frenum have generally followed lacerations of that part, have had considerable induration of base, and have been generally

slow of healing. *5th.* Ulcers of the glans have been generally excavated, but with little hardness of base; quickly throwing off a slough, and then healing rapidly.

It has sometimes happened, that where a sore has spread and occupied different textures, each of its parts has exhibited the character which has generally prevailed in sores confined to that particular texture. Thus, in a sore which has implicated part of the internal prepuce, corona, and glans; on the first spot it has been elevated, on the corona it has been indurated and irritable, and on the glans excavated, but with little hardness. Besides these differences, which have been apparently occasioned by position, ulcers on the organs of generation take on different actions, like those on different parts of the body, and are attended with simple purulent, or vitiated discharge,—with increased or decreased action,—with phagedæna, sloughing, &c. Excoriations also appear, which, in some instances proceed from mechanical injury, and in some from the application of an acrid matter, or from the acquired acrimony of the natural sebaceous secretion which lubricates the parts. In all these cases, early attention is a great means of preventing the sores from acquiring an irritable character. Cataplasms, astringents, and stimulants, have all their peculiar merits at particular times, and even the solution of arsenic has been found to give immediate relief from excruciating pain and phagedæna, which had followed great irritation previous to the patient being taken into hospital. In some cases blood-letting both local and general, has been had recourse to with advantage. In many cases cleanliness alone has effected the cure; but in no instance has the application been of such a nature as to destroy the structure of the parts, and by that means prevent the absorption of the virus; this is shown by the occurrence of secondary symptoms in our hospitals, which seldom take place when the primary sores are early destroyed.* In all cases, rest in the horizontal posture is an important part of the treatment. Some of the primary sores have gone on rapidly to a cure, some have been more slow, and a few have retained their hardened edges and bases for a long time; the great majority have healed as in ordinary cases, some leaving a pit or scar behind, and some, particularly the elevated sores, have had a scab formed, which, on dropping off, has left the parts sound beneath. In many instances, after having healed up, the sores having broken out again without any obvious cause; in others, the friction of the clothes, or rough handling, had occasioned their reappearance, and some on the prepuce have appeared as if mechanically torn open in the effort of uncovering the glans. In

* Some trials are now making on the comparative merits of destroying the sores by the nitrate of silver on their very first appearance.

all these cases, the healing of the renewed sore was as certainly effected without mercury, as that of the original one.

We have had frequent opportunities of remarking two or more sores of different kinds existing at the same time; an irregular shaped diffused sore; an elevated sore, covered with a light coloured slough, as if a bit of shamoy leather had been stuck on by some tenacious substance; a groove or streak along the glans, as if made by a scraping instrument, filled with purulent matter; and the true and perfect chancre according to Mr. Hunter's definition, or the true syphilitic ulcer according to Mr. Carmichael. This last has in some cases occupied the glans, in some the prepuce, while the sores of another description have been on the same part close beside it, or on another part at a distance. Three of these cases I particularly selected for examination and public demonstration in the castle hospital; in one, the Hunterian chancre was on the glans, and a sore without any hardness on the prepuce; in another, it was on the prepuce and a simple ulcer on the glans; in the third, a most perfect specimen of Hunterian chancre occupied the internal prepuce close to the corona glandis; and at about half an inch from it, nearer the frœnum, but farther from the glans, was an elevated ulcer: in all these cases the Hunterian chancre healed several days before the others.

Soldiers are gregarious in their amours, and we have frequently several men at the same time in hospital, infected by the same woman with whom they have had connexion in very rapid succession; some of them have had one kind of sore, some another, and some both.* In all the instances in the following tables where there have been two or more ulcers, if one has possessed the Hunterian characteristics, both the secondary symptoms and the primary sore have been classed under that head. We have been very careful in our endeavours to distinguish the sore that has the hardened edge and base *naturally*, from that which may acquire it by *art*. This can only be done by watching the sore from its very commencement, for there is not the smallest doubt, that a sore can be artificially produced by the application of the kali purum to a sound man, which is not to be distinguished from chancre by a person not aware of the circumstance; the hardened edge and base can be perfectly imitated, and

* A curious case is given by Vigarous, which occurred in six young Frenchmen, who had connexion successively with the same woman. The 1st and 4th in the order of connexion had chancres and buboes, the 2d and 3d gonorrhœa, the 5th chaucre, and the 6th bubo. Vigarous, *Œuvres de Chirurgie-practique, Civile et Militaire, Montpelier, 1812.* Complication du vice Venerien, page 8. I have had an instance of three individuals similarly circumstanced; the first escaped, the 2d had true chancres and elevated sores, the 3d had gonorrhœa. The connexions took place within an hour.

the specific distance (as it has been called) of the hardness can be increased or diminished by proper management of the caustic.

In primary sores of a complicated nature, the non-mercurial plan has been as strikingly useful as in the more simple. In phymosis, with clustering sores on the point of the prepuce, and concealed ulceration of the glans with hardened edges, where no irritating substance has been employed to occasion them, the success has been uniform; the livid chancre of Mr. Carmichael (page 26) has been treated with equal success. In fine, every thing I have seen of the practice confirms me in the possibility of healing primary sores on the genitals, of whatever description they may be, without the employment of mercury; and I have met with nothing to make me question the propriety of making the trial. Of some hundred cases, none have hitherto resisted; in some of these, it is true, I should never have thought of using mercury; but far the greater number were of that description, that not only I myself, but practitioners of much greater experience, would not formerly have thought of deferring it for a single day. I may, to a certain extent, apply the same observations to the secondary symptoms that have succeeded the non-mercurial treatment. I have now seen a great variety of them, but I have not yet studied and compared a sufficient number of cases, to enable me to offer such positive testimony to the expediency of abstaining from mercury altogether in this class, as in the former. The facts at present ascertained are these: secondary symptoms occur more frequently, and appear at an earlier and more determinate period than when mercury had been used; but they in many cases have gone off as soon, never, as has been supposed, proceeding from bad to worse, or from one succession of parts to another in unabated violence; on the contrary, they by no means exhibited the same violent and unrelenting symptoms which we have observed in many instances where mercury has been used; the eruptions have not run into ulceration; they have not formed into large scales, or extensive blotches; nor have the bones of the nose, or of other parts, been in any instance affected with caries. I cannot take upon me to assert, that these events *will not* occasionally take place, but in the numerous cases which I have watched with the utmost anxiety, I can aver that they *have not*.

With regard to the eruptions, there has been in many instances a general reddish mottled efflorescence of the skin, resembling roseola, or what the soldiers have themselves called "Trout Back." The more determinate eruptions have been papular, pustular, scaly, or tubercular; they have been chronic in their nature, and, as well as the sore throats and inflammations of the eye, they have all gradually, though sometimes slowly, disap-

peared without the use of mercury, and without seeming to have left any injurious effects behind them. Eruptions, so far as my observations go, are much more common in those treated without that remedy, than in those I have formerly seen treated with it, but in no instance have they ended in ulcerations, as the latter have frequently done. I have often had occasion to observe, that eruptions of the same nature and character have succeeded to the foul, indurated excavated ulcer, and to the simple excoriation; some of these eruptions have been more obstinate than others, and have required a treatment of several weeks, with decoct. sarsaparillæ, antimonials, the warm bath, &c., before they have disappeared; but I have not seen the general health more seriously affected in the cases under cure without mercury, than it has been when that remedy has been used. On the contrary, I am inclined to think that it has suffered less. In the annexed table will be seen the proportion which the different species of eruptions, and other secondary symptoms, have borne to each other, as well as the proportions in which the primary symptoms have appeared. I beg to say, however, that I do not assume this as the *constant* ratio in which these appearances take place.

In fifteen cases of eruptions unaccompanied by any other symptoms, which succeeded the Hunterian sore, six were tubercular, five exanthematous, two pustular, one tubercular and scaly, and one tubercular and vesicular.

In four cases following the same sore, but in which the eruptions were complicated with sore throat, two were tubercular, one was tubercular and scaly, and one was tubercular and exanthematous.

In twelve cases following the *Non-Hunterian* sore, and in which eruptions were the only symptoms, six were pustular, three were exanthematous, two were tubercular, and one was tubercular and scaly.

In seven cases where the eruption was accompanied with sore throat, three were exanthematous, two were tubercular, one was papular, scaly and tubercular, and one was pustular and tubercular. An examination of the table will show the existence of other morbid combinations.

The eruptions, after having disappeared, have, in some cases, again occurred a second and a third time, and in a different form from the original attack; cold and excess were the causes to which this re-occurrence has been principally traced. In these relapses, the mottled, the papular, and the pustular, have been the most common forms, and have in general preceded the scaly and the tubercular eruptions. The scaly, although in some instances it has been from the first under the form of psoriasis, or branny scurf, has been in general a degeneration of the papular,

and occasionally it has appeared on the apices of the tubular, or was intermixed with them. In truth, the eruptions have presented such appearances at different times, and have undergone such changes, as to bid defiance to correct classification. In one most obstinate case treated by Dr. Thomson at Queensberry House, the eruptions appeared at different times under the form of impetigo, acne, herpes, and psoriasis in succession, and even some specimens of each were co-existent at different periods during the course of the cure, but they all disappeared after a treatment of twenty weeks, during which the spontaneous efforts of nature were very little interfered with by medicine. The patient was of a scrofulous constitution, but he was dismissed from hospital with his health unimpaired, and far different from the state in which subjects of that description are usually left after mercurial courses.

In another very instructive case, an Hunterian chancre was at the distance of ten weeks, succeeded by a *papular eruption*, which, in the course of a month, was removed by low diet, purgatives, and the decoction of sarsaparilla. In two months after, an eruption of a similar nature appeared, without any fresh infection. This was treated by mercury continued during five weeks, and pushed to such an extent as to excite moderate salivation. Under this treatment the eruption faded, having during its progress assumed the appearance of *vesicles and pustules*, and at length falling off in amber-coloured *scales* with livid bases. Notwithstanding this mercurial course, the patient was a third time admitted at the distance of ten weeks, (without any intervening primary affection,) with a *pustular* eruption very similar to small-pox, but with bases more inflamed. This was finally cured without mercury in the course of six weeks, the pustules falling off in *squamulæ*. In one month after this attack, and without any fresh infection, he was a fourth time taken into hospital, with a very thickly dispersed pustular eruption, somewhat different in appearance from the former, being more numerous, smaller, and acuminate. It yielded in twenty-two days to the non-mercurial treatment. During all these attacks the patient suffered, though not severely, from aphthous sore throat, and occasional flying pains in his joints, but his general health was in no degree injured, and he is now in possession of a perfectly sound constitution, at the distance of nearly six months from the last attack. I conceive that this case very clearly proves, that even a full and judiciously conducted mercurial course does not prevent the re-appearance of venereal eruptions, and that they assume at different times different characters, notwithstanding the interruption they receive in their natural progress by the use of that remedy.

In some of these cases, I have observed considerable ad-

tages result from the employment of the acids internally, and also from their application externally to the eruptions. The local applications to some few of them have been the ungt. hydrargyr. nitrat. the ungt. picis. or a mixture of equal parts of both, but in no instance has the most remote approach been made towards affecting the constitution with the mercury contained in these compositions. The local applications to the primary sores, which have preceded these eruptions, have been the black wash of calomel and lime-water, saturnine lotions, cupreous solutions, and the unguentum resinosum.

I have not had occasion to see a single instance in which the bones of the nose have been affected: some cases of periostitis, and of pains and swellings of the bones of the cranium and the extremities, have been met with; but except in two, I have not myself seen any nodes which could be regarded as *unequivocally syphilitic*. One of these yielded to blisters and sarsaparilla, as many of the anomalous tumours had done before; the other, in which the guaiacum and sodorifics had been employed without effect, but in which the sarsaparilla and blisters had not been tried, was treated with mercury, and also disappeared; whether it would not have been combated without mercury, with equal success as the first case, I cannot take upon me to assert, and in an inquiry like the present, I shall offer nothing from conjecture.

It must be obvious, that, to bring the question of *eligibility* to the test of as rigid inquiry as the question of *possibility* has already undergone, will be a work of some time, and surely by every rational man it will be considered as time well spent. On this point I chiefly have to rely at present upon the trials made during the half years ending 20th of December, 1818, and 20th of June, 1819, in Edinburgh castle, conducted with the utmost accuracy, and entered upon with the strongest disposition to strict impartiality. In extent, they fall far short of what I could have desired, for the laws of rigid scrutiny required that not only should all cases of primary sores proceeding from sexual intercourse be included, whether possessed of the supposed genuine characteristics or not, as they had in preceding trials: but that, in order to guard against all sources of fallacy, no patient who had, on former occasions, been subjected to the non-mercurial cure, should be treated on the new comparative plan, (for primary affections at least,) for great ambiguity would arise in any secondary symptoms that might occur in individuals where the two modes had been adopted. With this exception, the patients were taken indiscriminately as they came into hospital. But there was another circumstance which curtailed the number of our comparative trials, viz. the diminution of our applicants for relief, and this not confined to Edinburgh alone, but extending

over all the quarters occupied by our troops. Our numbers treated in hospitals during the half year ending 20th of June, 1818, were 148 primary venereal cases, and that ending 20th of December, only 105; of these only 14 *fresh* cases appeared in Edinburgh among the infantry, and 2 among the cavalry; and only 11 were met with at Glasgow, a diminution so extraordinary as to give every reason to suppose that it did not depend on chance. Whether it may have proceeded from increased cleanliness on the part of the soldiers and their paramours, or from the actual disappearance or modification of the poisons contracted by sexual intercourse, I shall not pretend to say; but no person knowing the character of British soldiers will suppose that morality had any thing to do in the business, for they exposed themselves then, as they always have done, to every disease which can be produced by unbounded venereal excesses with the most depraved objects in nature.

Eighteen primary affections were treated in Edinburgh castle by the most approved mercurial plan. Of these, three possessed the reputed syphilitic characters more or less, and fifteen were without them. The three of the first class consisted of one case of chancre alone, and two of chancre and bubo, both of which buboes had commenced before admission into hospital. The cure of these cases was effected as follows: two of the chancrea healed in ten days, and one in twelve; the bubo which did not suppurate was discussed in sixteen days, that which suppurated remained open for forty-two days.

We now turn to the fifteen non-syphilitic cases; ten of them were ulcers only, and five were ulcers and buboes, four of which buboes had appeared before admission into the hospital, and one afterwards. The ulcers healed as follows: two in 4 days, one in 8 days, four in 11 days, three in 14 days, one in 28 days, one in 32 days, one in 36 days, one remained under cure at the end of the half year, and another, from having been treated before coming into hospital, is not taken into account, as we could not be accurate as to the number of the days. Of the five buboes, three were discussed, one in 4 days, one in 7 days, and a third in 26 days; and two suppurated, one of these healed in 32 days, the other remained under cure at the end of the half year. No secondary symptoms have, to the date of the latest report, appeared in any of these cases.

I shall now give an average table, observing first that the averages in it are taken from 47 cases on one side of the question, and 18 only on the other, or an excess of more than one and a half of the cases treated without mercury over those treated with it.

TABLE showing the average Number of Days required for the Cure of different kinds of Primary Venereal Affections, with Mercury, and without it.

Description of Cases treated.	Average Number of Days required for the Cure without Mercury.	Average Number of Days required for the Cure with Mercury.
Ulcers with the reputed Syphilitic characters..	24 $\frac{6}{7}$	10 $\frac{2}{9}$
Ditto without the reputed Syphilitic characters	15 $\frac{1}{4}$ $\frac{3}{4}$	15 $\frac{3}{1}$ $\frac{3}{3}$
Buboës ending in resolution, and following Hunterian Chancres.....	28 $\frac{1}{3}$	16
Buboës ending in resolution, and following Non-Hunterian Chancres.....	28 $\frac{2}{3}$	12 $\frac{1}{3}$
Buboës ending in suppuration, and following Hunterian Chancres.....	104 $\frac{1}{3}$	42
Buboës ending in suppuration, and following Non-Hunterian Chancres.....	52 $\frac{1}{2}$	32

Thus, then, the balance from these limited and disproportionate trials appears to be considerably in favour of the mercurial plan in the primary sores. The ulcers with the reputed syphilitic characters yielded in less than half the time, while those without it were very nearly, if not quite on par. The buboës of a syphilitic nature were resolved in a little more than half the time, and those of the non-syphilitic in a little less. The buboës which suppurred, and which bore the syphilitic characters, healed in much less than half the time; those which did not possess these characters required considerably more.

The comparative trials did not stop here; four secondary cases were treated with mercury, and five without it. The following tables, No. I. and II. exhibit the results; they were drawn up by Mr. Johnston, to whom exclusively all the credit of these trials is due.

No. I.

TABLE showing the Period of Occurrence and Time required for the Cure of Secondary Affections with Mercury.

Description of Primary Affection.	Description of Secondary Affection.	Period of occurrence after the Primary Sores.	Time required for the Cure.
Hunterian Chancre.	Sore throat, swelling of the Fascia and Ligaments.....	11 months	5 months
Non-Hunterian.	Tubercular,* Scaly, and Papular Eruption.....	56 days	36 days
Do.	Tubercular Eruption, with Sore Throat.....	38 days	38 days
Do.	Papular, Scaly, and Tubercular Eruption, with Sore Throat, and Affections of the Bones..	15 months	Remained under cure at the end of the half year.

No. II.

TABLE showing the Period of Occurrence and Time required for the Cure of Secondary Affections without Mercury.

Description of Primary Affection.	Description of Secondary Affection.	Period of occurrence after the Primary Sores.	Time required for the Cure.
Hunterian Chancre.	Eruptions, Scaly, Pustular, Tubercular, and Papular.....	3 months	26 days
Do.	Affections of the Bones only...	12 months	24 days
Non-Hunterian.	Tubercular Eruption, with Sore Throat.....	110 days	34 days
Do.	Scaly and Tubercular Eruption, with Sore Throat.....	8 months	74 days
Do.	Scaly and Tubercular Eruption, with Sore Throat.....	10 months	35 days

I may observe, that in one of these cases treated by mercury that mode of cure was followed, because, before the man came into the head quarters hospital, he had been treated with

* The Tubercula, though denied to exist as a consequence of true syphilitic ulcers, have been by no means an unfrequent occurrence with us after sores possessing much of that character, and what is not a little extraordinary, the smooth tubercle has existed along with the rough, and the florid with the livid, at the same time, in the same subject.

mercury. In a second it was used, because the disease was of great obstinacy, and did not yield to the non-mercurial treatment. In the two others it was tried to accelerate the removal of symptoms which had of themselves begun to yield.

I count little or nothing on these trials, and shall draw no parallel from them; but I deemed it but fair to mention them, since they were treated with mercury, though not altogether as could have been wished. The great difficulty in these particular cases is, to find secondary symptoms for comparative trials alike in all, or nearly all respects. From causes beyond Mr. Johnston's control, salivation occurred in three, and mercurial eczema in two instances. In one instance I had occasion to remark, for the first time since my arrival in Scotland, the livid retorted edge of bubo,—a very well-known acquaintance under the violent mercurial practice; and, in another, the mercurial ulceration of the throat, with general erythema, doubtless from some peculiarity of constitution.

The next comparative trials were made during the half year between December, 1818, and June, 1819. Thirty-four patients were subjected to them, 16 of whom were cured with mercury, and 18 without it.

The following table will show these results at one view.

AVERAGE TABLE of Comparative Results with and without Mercury.

Description of Cases treated.	Number of Days with Mercury.	Number of Days without Mercury.
Hunterian Ulcers.....	18 $\frac{2}{3}$	9
Non-Hunterian Ulcers.....	26 $\frac{7}{11}$	26 $\frac{5}{6}$
Buboës discussed following Hunterian Ulcers.	—	—
Buboës discussed following Non-Hunterian Ulcers.....	33 $\frac{1}{2}$	22 $\frac{3}{5}$
Buboës suppurated following Hunterian Ulcers	43	—
Buboës suppurated following Non-Hunterian Ulcers.....	76 $\frac{1}{2}$	27

Among the patients treated with mercury, constitutional symptoms appeared in one, in the form of tubercular eruption and periostitis, with great debility. In those treated without mercury, secondary symptoms appeared in two instances; one of these presented scaly, brown blotches, scarcely elevated; the other, general erythema, and a pustular eruption; but as it appeared three days only after the appearance of chancre, and that

the patient had had syphilis in 1818, which was cured by mercury, the connexion of these symptoms with his present disease is very doubtful.

The results of this half year's comparative trials, when contrasted with those of the preceding one, are peculiarly striking, for they are altogether as decidedly in favour of the non-mercurial plan, as the others were the reverse. A prudent and unprejudiced practitioner, knowing that mercury will agree with one set of patients, and disagree with another, though their symptoms may be alike, and even contracted from the same source, will not draw hasty conclusions from either, but will wait patiently, until, in the progress of events, the respective merits of those plans become more fully developed. Indeed, the numbers subjected to comparison are too limited to deduce from them any positive or fixed corollaries.

Since the date of the last trials by Mr. Johnston, mentioned above, I find by a report from him, transmitted to me from the station to which he moved from Edinburgh Castle, that, in one of his cases treated with mercury, for a constitutional affection, consisting of periostitis and eruption, which was tubercular on the shoulders, and on the face resembled "*rupia prominens*," he apprehended that mercury would not prove effectual, and that it might be necessary to leave it off to complete a cure; indeed, it was persisted in but a short time, as, during its continuance, all the symptoms of the constitutional disease had gone on from bad to worse; the primary symptoms had not been removed, and the general health of the patient had been materially injured by the mercurial treatment, although conducted in a cautious and moderate manner: soon after the mercury was left off, a sensible improvement took place in the general health of the patient, and all the symptoms of his disease gradually disappeared. His convalescence, however, was slow, and he was not discharged till three months afterwards.

Another of these patients, treated with mercury, had undergone that treatment when on detachment at Aberdeen, and had left that station to join the head quarters of the regiment, at Hull, before the disease was completely cured. On his arrival at the latter place, he was taken into hospital with a sore on the penis, much irritated and extended by the march, and his general health much injured by the mercury which he had used for its cure; the treatment with mercury was therefore not resumed, but the cure of the sore was effected by such means as would have been used for the cure of a simple inflamed ulcer. This individual has since suffered attacks of pulmonic inflammation and rheumatism; and there can be little doubt that in him the predisposition to inflammatory disease has been the conse-

quence of his use of mercury. A third patient treated with mercury, had, during his treatment for the primary symptoms, a pustular eruption over the shoulders, which was first accompanied by a slight febrile movement, but as yet, no other constitutional symptoms have appeared.

Mr. Johnston concludes his half yearly report with the following observations:—"From the foregoing account of the syphilitic diseases which I have treated for the last half year it appears, that of three cases in which mercury had been used, secondary symptoms have occurred in two while the primary were under treatment, in one of which it became necessary to abandon the use of mercury before a cure could be effected, and that in this patient, as also in the third, the introduction of that substance had occasioned consequences highly pernicious to the general health; on the other hand, it appears, that of the twenty primary cases treated without mercury, constitutional symptoms have appeared in three during their cure, in two of which this affection consisted solely of an eruption so unimportant, that it probably would have escaped the notice of the patients themselves, unless it had been pointed out to them; that in the third case, it seemed extremely doubtful whether the constitutional symptoms had had a venereal origin, or were only to be considered as a distinct cutaneous disease, accidentally occurring while the patient laboured under primary syphilis. It also appears that only one case with secondary symptoms has occurred, as the consequence of some former primary affection treated without mercury; and which secondary symptoms appear at present to be going on towards a cure without the use of that substance.

I shall now give the Analytical Tables drawn from the practice of the regimental surgeons, in those corps of the army which were quartered in Scotland, during a considerable portion of the time that I held the superintendence of that part of the united kingdom. For two half-yearly periods, I was not able to construct the return as accurately as I could have wished; I therefore forwarded the reports of individual corps direct to the Board, and the results appear in the circular letter annexed.

ANALYTICAL RETURN of Venereal Diseases treated without Mercury, in the Military Hospitals of Scotland, under the Superintendence of JOHN HENNEN, M. D. Deputy-inspector, from June 20th, 1817, to December 20th, 1819.

PRIMARY AFFECTIONS.

1. Description of Cases that have been Treated.

A. Affections possessing the true Hunterian character.	a. Ulcers only	109	
	b. Buboës succeeding to ulcers.		
B. Affections of various kinds not possessing the true Hunterian character.	a. Ulcers only	154	
	b. Buboës succeeding to ulcers.		
	c. Buboës without previous ulcer	2	240
	Total number of primary affections treated		

2. Time required for the Cure.

A. OF ULCERS.

Hunterian.		Non-Hunterian.	
The following number of cases were cured.	In the following number of days.	The following number of cases were cured.	In the following number of days.
36	From 5 to 10	63	From 3 to 10
19	11 20	40	11 20
42	21 30	43	21 30
13	31 40	10	31 40
13	41 50	5	41 50
5	51 60	1	51 60
1	71 80	1	61 70
2	91 98	2	71 80
4 under cure at the date of last return.		4	81 90
		1	93
		1	109
		1	113
		18 under cure at date of last return.	

B. OF BUBOES ENDING IN RESOLUTION.

Buboies following Hunterian Ulcers.		Following Non-Hunterian Ulcers.	
The following number of cases were cured.	In the following number of days.	The following number of cases were cured.	In the following number of days.
5	From 5 to 10	10	From 2 to 10
8	11 20	18	11 20
15	21 30	13	21 30
4	31 40	4	31 40
8	41 50	4	41 60
2 under cure at the date of last return.		4 under cure at the date of last return.	

C. OF BUBOES ENDING IN SUPPURATION.

Buboies following Hunterian Ulcers.		Following Non-Hunterian Ulcers.	
The following number of cases were cured.	In the following number of days.	The following number of cases were cured.	In the following number of days.
2	From 30 to 40	1	From 7 to 10
3	41 50	2	11 20
2	51 60	5	21 30
2	61 70	3	31 40
1	77	4	41 50
1	92	3	51 60
4 under cure at the date of last return.		1	71 80
		3	91 100
		2	101 110
		2	111 113
		1	179
		4 under cure at the date of last return.	

Note.—In the Table A, of Ulcers, the period of cure of some of these affections is not specified, as it was not fully ascertained from some corps; but in no case did it extend beyond the average period of the cases which are specified in the table.

SECONDARY AFFECTIONS.

I. Description of Cases Treated.

A. Succeeding the Hungarian ulcer.	a. Eruptions only	α. Tubercular	6	15
		β. Exanthematous	5	
		γ. Pustular	2	
		δ. Tubercular and Scaly	1	
		ε. Tubercular and Vesicular	1	
	b. Eruptions combined with sore throat.	α. Tubercular	2	4
		β. Tubercular and Scaly	1	
		γ. Tubercular and Exanthematous	1	
B. Succeeding Ulcers not Hungarian.	a. Eruptions only	c. Tubercular Eruption combined with Iritis	1	1
		d. Tubercular and Papular Eruption, combined with Iritis, Periostitis, and Sore Throat	3	
		e. Tubercular and Exanthematous Eruption combined with Periostitis	2	
		f. Sore Throat only	1	
		g. Exostosis only	1	
	b. Eruptions combined with sore throat.	—	—	24
		α. Pustular	6	12
		β. Exanthematous	3	
	c. Sore Throat only.	γ. Tubercular	2	
		δ. Tubercular and Scaly	1	
		α. Exanthematous	3	7
		β. Tubercular	2	
	b. Eruptions combined with sore throat.	γ. Papular, Scaly, and Tubercular	1	
		δ. Pustular and Tubercular	1	
	c. Sore Throat only.	—	—	22
		—	—	46
Total number of Secondary Affections Treated				

II. *Period of Occurrence, and Time required for the Cure.*

A. Succeeding the Hunterian Ulcer.	Description of Primary Affections to which they succeeded.	No. of Cases.	Description of Secondary Affection.	Period of occurrence after Primary Affection.	Time required for the Cure.	
					From 7 ds to 6 ms	From 10 to 60 ds
	6	Tubercular Eruption.....		From 7 ds to 6 ms	From 10 to 60 ds	
	5	Exanthematous Eruption.....		— 28 ds to 6 ms	3 to 42 ds	
	2	Pustular Eruption.....		— 21 ds to 38 ds	18 to 43 ds	
	1	Tubercular and Scaly Eruption		40 ds	25 ds	
	1	Tubercular and Vesicular Eruption.....		22 weeks	27 ds	
		Tubercular Eruption with Sore Throat		— 46 to 75 ds	— 31 to 240	
	1	Tubercular and Scaly Eruption with Sore Throat.....		5 weeks	66 ds	
	1	Tubercul. and Exanthematous Eruption with Sore Throat.		2 ms	60 ds	
	1	Tubercular Eruption combined with Iritis.....		14 weeks	45 ds	
	1	Tubercular and Papular Eruption combined with Iritis, Periostitis, and Sore Throat		45 ds	84 ds	
	1	Tubercular and Exanthematous Eruption combined with Periostitis.....		5 ms	28 ds	
	1	Sore Throat only.....		5 weeks	33 ds	
	1	Exostosis only		74 ds	14 ms	
	5	Pustular Eruption.....		From 49 to 320 ds	From 19 to 58 ds	
	6	1 Pustular Eruption.....		5 ms	Under cure	
		2 Exanthematous Eruption.		90 to 240 ds	date of last return	
	3	1 Exanthematous Eruption.		298 ds	From 28 to 120 ds	
	2	Tubercular Eruption.....		— 23 to 122 ds	Under cure	
	1	Tubercular and Scaly Eruption*		19 ms	date of last return	
		1 Exanthematous Eruption with Sore Throat.....		Simultaneous with the Ulceration	29 ds	
	3	1 Exanthematous Eruption with Sore Throat.....		4 weeks	42 ds	
		1 Exanthematous Eruption with Sore Throat.....		59 ds	Under cure	
	2	Tubercular Eruption with Sore Throat.....		— 75 to 91	date of last return	
	1	Papular, Scaly, and Tubercular Eruption with Sore Throat*.....		20 ms	From 14 to 31 ds	
	1	Pustular and Tubercular Eruption with Sore Throat.....		68 ds	Under cure at	
	3	Sore Throat only.....		— 50 to 77 ds	the date of last return	
					From 43 to 63 ds	

* Primary Affections cured by Mercury at a former period.

One half at least of the primary symptoms in the foregoing return were daily under my notice; and I saw in my different tours of inspection at least one half of the remainder. Every secondary case I particularly examined, and of these three-fourths were constantly under my inspection; I trust, therefore, that I may be acquitted by every candid reader of having taken up my opinions on insufficient grounds: few men could have been more fortunate in their opportunities, and I assuredly am not conscious of having either abused or perverted them.*

The results above stated have been drawn from a very limited number of patients compared to those on whose cases the interesting remarks contained in the following circular letter, addressed to the surgeons of the army, are founded.

(COPY)

Army Medical Department,
2d April, 1819.

Circular.

ON SYPHILIS.

In transmitting the following summary of the conclusions on the question of syphilis and its treatment, we have to assure all that it may be considered as an unprejudiced statement drawn up from the answers *alone* of the regimental surgeons, to the queries transmitted by us to them in December last.

Without Mercury.

1st, That since December, 1816, to December, 1818, there appears to have been treated for primary venereal ulcerations on the penis (including not only the more simple sores, but also a regular proportion of those with the most marked characters of syphilitic chancre, as described by Hunter and other writers,) 1940 cases.

2d, That of these 1940 cases so treated, 96 have had secondary symptoms of different sorts.

3d, That in these 96 cases of secondary symptoms following sores treated without mercury, it was deemed necessary to have recourse to mercury for a cure for twelve of them, for which change the following different reasons are assigned in different cases by the surgeons who treated them.

* All my cases are, of course, included in the General Return of the Army at large.

- a. On account of sloughing ulcers in the throat.
- b. The protraction of cure beyond the third week.
- c. Because the general health seemed to suffer.
- d. With a view of expediting the cure.
- e. The reappearance of eruptions, or aggravation of symptoms.

Note.—In several of these 12 cases, alterative doses of mercury were sufficient to effect the cure.

4th, That in 1940 cases of primary symptoms treated without mercury, (as described in par. 1st,) its use was resorted to in 65 of them; the reason assigned being as follows:—

- a. An indisposition to yield to the local application in three weeks.
- b. The sore spreading.
- c. The appearance of fresh sores.
- d. Buboës suppurating, and not disposed to heal.
- e. The general health appearing to suffer.
- f. A belief that the constitution became affected from the continuance of the sores.

5th, That these 1940 cases, treated as here above stated, are now “recovered of their venereal complaints,” and either doing their duty as soldiers, or have been discharged for military reasons totally unconnected with venereal disease.

6th, That the principal remedies employed have been (speaking in general terms, and with reference to primary sores) confinement to bed in many cases, in all to hospital, spoon diet, occasionally general bleeding when inflammation ran high, (in six or eight cases,) purgatives, antimonials, pretty generally emollient soothing applications in the first instance, generally cold or warm water, (the latter frequently injected between the prepuce and glans,) and the first externally applied, the water frequently mixed with the liquor plumbi; in the latter stages, the lotio hyd. submuriat., or muriat. in aqua calcis, lotio sulphat. cupri. argent., nitrat., &c. were employed. With reference to secondary symptoms, when mercury was not had recourse to, purgatives, antimonials, nitric acid, sarsaparilla, guaiacum in substance, or in combination with sarsaparilla, warm bath, nitro-muriatic acid bath, gargles when the throat is affected. In nodes, fomentations, scarifications, leeches, and blisters.

7th, That the average period required for the cure of primary symptoms without mercury, when bubo did not exist, has been 21 days; with bubo 45 days.

8th, That the average period for the cure of secondary symptoms without mercury has been from 28 to 45 days.

9th, That every man treated without mercury has been fit for immediate military duty on dismissal from hospital.

With Mercury.

1st, That during the period specified before, there appears to have been treated of venereal ulcerations of the penis (the characters given of which do not appear to have been, in any essential degree, different from those treated without mercury) 2827.

Note.—"It may be perhaps well to view these as more generally bearing the character of Hunter's chancre."

2d, That of the 2827 thus treated and healed, 51 have had secondary symptoms.

3d, That there are good grounds for believing, that, in the majority of instances, when secondary symptoms have occurred where the primary symptoms have been treated with mercury, that the secondary symptoms are more severe, and more intractable than when mercury had not been used for the primary sores.

4th, That one man treated by mercury for primary sores has been discharged the service on account of the injury his constitution sustained therefrom.

5th, That another man, after treatment for secondary symptoms by mercury, has been discharged the service in consequence of that complaint.

6th, That the average period occupied for the cure of primary symptoms without bubo, with mercury, has been 33 days, with bubo 50 days, and that the great majority were fit for immediate military duty on dismissal from hospital.

7th, That the average period occupied in the cure of secondary symptoms has been 45 days.

Note.—"The treatment by mercury is so generally known that it is deemed useless to describe it in either case." Much the same local applications were used in the treatment with mercury to the sores, as was described in that without it; perhaps more stimulating and escharotic applications were used, and less attention paid to regimen and diet, when mercury was given, at least less stress seems to have been laid on these.

General Observations.

1st, From the statement above made, it would appear that *all kinds of sores*, or primary symptoms of syphilis, may be cured (as far as a period of nearly two years will warrant the conclusion) without mercury.

It is considered that the exceptions noted in paragraph 4th do not present valid objections to the above conclusion on viewing the general testimonies on this point; but to the reasons there assigned for the necessity of having recourse to mercury the most particular attention is required, as on these must the propriety or impropriety of that measure depend.

2d, To guard against any fallacy in the comparative estimate of time employed in the cure of primary symptoms with and without bubo, it must be noticed that this is only an average statement; in some individual regiments the period required without mercury has been longer than that with mercury.

3d, That it appears that the frequency or rarity of secondary symptoms would seem to depend on circumstances not yet sufficiently understood or explained, although the following fact would tend to the belief that either the constitutions of the men, or the mode of conducting the treatment without mercury, are the causes that possess the greatest influence in their production.

In one regiment 4 secondary cases out of 24 treated without mercury supervened. In another regiment 68 cases have been treated within the specified time without mercury, all bearing marks of true venereal disease, (and 28 of these especially selected for their decided characters of chancre;) no secondary symptoms of any kind have hitherto made their appearance, and in all fifteen months have elapsed since they were treated.

To this circumstance most particular attention is required, both with the view of ascertaining if peculiarity of constitution influences the appearance of secondary symptoms, and of pointing out the necessity of attending to the proper selection of local remedies adapted to the different stages and states of the sore, and to the general treatment of the constitution during the time the patients are in hospital, and that whether mercury be used or not.

4th, That it appears that no peculiar secondary symptoms are seen to follow from peculiar primary sores.

5th, It has been remarked, that in cases healed without mercury, iritis has been frequently observed as a secondary symptom, in some instances by itself, in others attended with eruptions of different kinds. In these instances, mercury has been generally resorted to with success.

6th, The reappearance of the primary ulcer, and repeated attacks of eruption, are the diseases which have been most frequently observed to succeed the non-mercurial practice.

7th, The conclusions arrived at by the additional testimony of many more regiments, not included in the number from whence this report has been drawn up, confirm in every ma-

terial circumstance the results stated under both methods of treatment.

From all that has been reported to us, we see no reason to stop the prosecution of the present inquiry, nor have we any objection to its being continued, but strictly in that spirit of patience, liberality, candour, and fidelity, that ought to characterize the inquiries after truth,—a spirit altogether remote from the precipitancy of innovation, the acrimony of disputants, or the stickler for any particular doctrine.

1st, It is therefore desired, that the queries heretofore submitted, with these additional points left undecided in this letter, may be considered as the leading objects for consideration in the future prosecution of the subject.

2d, That every syphilitic case, whether secondary or primary, be duly entered in the register, with full description of the characters of the sores, symptoms, and treatment, so that the results of each half year may be distinctly and clearly stated in the reports required on these occasions;—that every man belonging to any regiment, treated in a different regimental hospital to his own, shall invariably be reported through this office to his own regimental surgeon, who will duly register the report, and at the half yearly periods state the results.

That it is essentially necessary that each regimental surgeon keep a watchful eye over all men treated without mercury, and frequently examine them, and that whenever answers are required to these queries at a future period, which they will, (say 1st January, 1820,) the state of the men now reported shall at that time be distinctly referred to, in the same tabular form as was required by the late queries, commencing as before from 20th December 1816.

We wish it to be distinctly understood, that we do not enforce the non-mercurial plan of treatment in any case, still farther is it our wish to incur any unnecessary risk or danger to the soldiers, by unnecessary detention from duty, from a protracted treatment without mercury, in those cases where it has been begun. At all times, this is left to the discretion of the surgeon, who, we are persuaded, will act in the most conscientious manner for the good of his patient, and the interests of the service.

(Signed) "J. M'GRIGOR,
 "W. FRANKLIN."

A fresh objection has recently been started to the non-mercurial practice in syphilis, by Dr. Hamilton, junior, Professor

of Midwifery in the University of Edinburgh, in his work on the "Uses and Abuses of Mercurial Medicines." He conceives that very alarming consequences are likely to arise to children yet unborn from the practice of the army surgeons. But while I most willingly acknowledge the high character, acuteness, and zeal of my former teacher, I cannot admit the validity of the arguments he adduces to prove the truth of his opinion, which appears to me to be chiefly founded on the assumption that a point of pathology is perfectly settled, which still remains not only dubious in all its relations, but which is actually denied by very high authorities.

It must be recollect that there are various opinions on the subject of the venereal disease of the *fœtus in utero*; they are as follows: 1st, It is contended that the *mother*, not the father, communicates the disease to the *fœtus*. 2d, That it is the *father*, not the mother. 3d, That the child can be diseased by both parties. And 4th, Mr. John Hunter denies the possibility of the *fœtus in utero* being affected by either.*

I am well aware of the difficulty of forming a judgment in these points, and of the great delicacy necessary to be observed in investigating them, but it becomes an important duty for every professional man to throw out what light he can upon the subject; and under this impression I shall first state my speculative opinions, and then I shall detail such facts as I have been able to collect. Unless a man has primary symptoms himself, I apprehend it is physically impossible for him to communicate primary symptoms to a female. Unless a female has primary symptoms, I hold it equally impossible for her to have secondary symptoms; and except she has secondary symptoms, she, I apprehend, cannot communicate them to the children in her womb; she may, indeed, as we all know, communicate primary sores to the *fœtus* in its passage through her vagina. With regard to the facts to be met with in authors, many instances are on record, and within our daily view, where women having secondary symptoms bring forth healthy children; and many, where fathers, who have long had secondary symptoms, beget a perfectly sound offspring. That children are born with a disease, *supposed* to be syphilis, and that this disease is not only fatal to them, but can be communicated by them to their nurses, and be propagated by the nurse to the destruction of more lives, is a fact that no man can

* Mr. Hunter's commentator, Dr. Adams, asserts that Mr. H. was of a different opinion. I own my inability to understand many parts of his writings; but I follow what appears to me to be Mr. H.'s meaning deducible from his opinion; that the matter of secondary sores is incapable of producing the disease; and this view is, I believe, generally adopted. See Adams's Hunter, 8vo. edit. 1810, p. 427

pretend to deny. The nurse, however, must have a primary sore on her nipple or elsewhere, before she can disease the child. I know it to be a positive fact, that a nurse with secondary symptoms may suckle children with perfect impunity to them. Many instances have occurred where children have been diseased without the most remote proof that the father has ever been poxed. Many others where there is equally strong reason to suppose that the mother has never been poxed; and many where there is every reason to suppose that *neither* party have had the disease. To these positions, which are applicable to the individuals of both sexes, has been added another, which is common to each, viz., that the wounds and fractures of persons infected with syphilis, unless when inflicted on diseased parts or their neighbourhood, heal as readily as those of uninfected persons,—a fact first insisted upon by Petit, which shows how little the powers which regenerate or model the human frame are affected by the syphilitic virus. Instances have occurred where a sound mother has brought forth a diseased child, and without taking any medicines of a mercurial kind, has afterwards brought forth a sound child. A case has been stated to me, where five children were thus *chequered*, while the mother, sound to all appearance, had never taken one grain of mercury; and to my own knowledge, a lady has brought forth three children at successive births, the 1st and 3d diseased, the 2d sound, without having taken any medicine but the decoction of the woods: the husbands in both cases men of irreproachable lives, and the women of acknowledged virtue. Whether there are any cases on record, where of two children born at the *same time*, one has been diseased and the other sound, I have not yet been able to ascertain.

It is doubtless very difficult to say why the *fœtus* should not be liable to syphilitic infection from its parents, seeing that other diseases are equally transmitted by both parties; but I think the facts above stated render it extremely doubtful from which of the parties the disease is transmitted, or, indeed, whether it is transmitted by either; at all events, we have proof that sound children have been produced from diseased parents, and that diseased children have been produced from sound parents. The ablest men have distrusted their judgment on these points, and surely, at an era like the present, when we have been obliged to give up many articles of our syphilitic creed which had been admitted by general consent, we cannot be accused of obstinate scepticism when we hesitate at allowing as certain, a point which has been debated for more than three centuries.

I have already said that children are born infected with a disease capable of infecting others,—but is this disease really and truly syphilitic? To suppose that its syphilitic nature is

proved by its yielding to mercury, is throwing us back into the abyss of error from which we have but recently escaped, and establishing that *retrospective diagnosis* which has already given rise to so much confusion. It is quite unnecessary among modern pathologists to assert, that because a disease has yielded to mercury, it is not necessarily syphilis. Neither are habitual abortions to be charged upon syphilis, because the habit may at a subsequent period be broken by a course of mercury.

Wherever the impregnation of a female, whether human or brute, has been the subject of speculative inquiry, the inquirers have indulged themselves in whims the most extravagantly capricious, and many of their experiments, if not the follies, may be looked upon as at least the toys of the learned. I have therefore thought it more satisfactory not to enter into theoretical speculations, but to elicit all the facts that I could. The *presumption* certainly was not in favour of the deadly effects on the rising generation which Dr. Hamilton has assumed; for in that case, the population of Italy formerly, and that of Portugal at the present day, must have been most seriously diminished; indeed, the inhabitants of the latter country, especially about Lisbon and other great towns, should by this time have been almost extinct. From a wish to collect every fact, I circulated a set of queries in Scotland and in the northern district of England, the results of which are given in the following table. This table is less complete than it will hereafter be made, when more evidence is collected, and when a longer period has elapsed, from the dismissal of the patients from hospital treatment. Measures, however, have been taken which, in their operation, will subject to the most rigid inquiry this and every point, either directly or remotely connected with the syphilitic question; and which, it is to be expected, will leave us one disease at least, where facts and not opinions will be the basis upon which our practice is to be founded.

RETURN showing the Number of Children born of Parents who have undergone the Non-Mercurial Cure for Syphilis, with the results, as far as can be ascertained.

Edinburgh, December, 1819.

REGIMENTS.	No. Born of Parents as above.		No. Born unhealthy, with the result.	No. who have become unhealthy since Birth.		REMARKS.
	No. Still Born.	No. Born healthy.		No.	Of whom have Died.	
				No.	Period of Death.	
4th Drag. Guards,						None married.
6th Do.						No Births.
7th Hussars,						None married.
10th Do.						None married.
15th Do.						None married.
13th Foot,						{ Four men only have married, none of whom have Children.
31st Do.						{ Two Men only married,—as yet without offspring.
40th Do.	3	3				{ These Children are respectively 3, 8, and 14 months old, and all healthy.
80th Do.	1	1				{ This Child is now 5 months old, and in every respect healthy.
88th Do.	8	2	6			{ These cases will be explained hereafter.
Detachment of Do.	1	1		1	4 m.	{ This Child's disease was obstinate Porri-go, a disease altogether unconnected with Syphilis.
1st Batt. Rifle Brig.						No Births.
7th Veteran Batt.						{ No distinct accounts received.
Edinburgh Depôt,						{ No distinct accounts can be collected.
Camp George,						No Births.
Totals,	13	211		1	4	

From this table it appears, that of 13 children born of parents treated without mercury, 11 have been born alive, and healthy, and two have been still-born; none of the 11 children have since died, nor manifested any suspicious symptoms of ill health, although some of them are now in their third year. Indeed, I question whether the balance of survivorship (assumed on the principles of Halley, De Moivre, or Price) is not in favour of the children born of parents treated without mercury; but this is a point which must be ascertained from a much greater number of individuals than my table at present comprehends. I shall therefore leave speculation for which I have not sufficient data, and proceed to explain the cases of the two still-born children, and of the child who was taken ill four months after birth.

Although I was well aware that infected women often produce sound children, I was extremely anxious to ascertain the point in the person of a woman of the 88th regiment, noticed in the above return, who excited great attention in the hospital of Edinburgh castle. I watched her with great anxiety; but before her full period of utero-gestation, she moved to Hull with her husband and the regiment. I therefore wrote to Mr. Johnston, surgeon of the corps, respecting her, and I received from that gentleman the letter which follows, in which an account is not only given of the woman I inquired after, but also of another, of whose case I was not aware when I wrote:—“ Of Mrs. F., who was treated without mercury for secondary venereal symptoms, while in a state of pregnancy in the latter end of 1818, and the beginning of 1819, I beg leave to state the following particulars: At the time of the appearance of the secondary symptoms, she was three months pregnant; and, according to her account, for about a fortnight previous to their appearance, she had been affected with excoriations of the labia, discharge from the vagina, and a bubo in the right groin; these local symptoms had disappeared at the time she was under treatment. Her husband was never known to me to have a venereal complaint, no appearance of disease having ever been detected upon him at my health inspections; but she says she had reason to believe he had the disease some time before her own illness, from his having had commerce with a woman of the town, and from her having observed an eruption of blotches on his legs. Her treatment was continued three months and a half, when the eruption disappeared, leaving slight depressions in the cuticle, somewhat discoloured; the fauces continued slightly inflamed for a considerable time after her discharge from the hospital; she is at present in perfect health. She had a still-born child about six weeks after her discharge, and at the 8th month of her pregnancy; she had not felt the movement of the foetus for about two months before

the birth, and thinks she must have carried it a long time dead. I was not informed of her delivery, and did *not see* the child; but she informs me that the cuticle was stript from the thighs, hands, and fore arms, that there was no appearance of eruption, or any other mark of disease, discoverable on any part of the child.

“Another woman of the regiment was treated during the same time without mercury for ulcers on the labia and sore throat; this last she ascribed to cold, and it was not accompanied by any other secondary symptom, which leaves some doubt of its nature; but its obstinate continuance gives reason to suspect that it was venereal. She was also pregnant about five months at the commencement of her treatment. She was under treatment six weeks, and at the end of the seventh month of the pregnancy was delivered of a dead child. As in the former instance, I was not informed of her delivery, and did *not see* the child, but she describes the appearances as being similar to those of the preceding woman’s child, only that the abrasion of the cuticle took place to a greater extent, and was upon the arms and the sides, and a livid-coloured bulla was observed on the back of one hand. No other marks of disease was observed. Her husband was treated in the hospital for an ulcer on the penis without mercury, in February 1818. In no other instance among the children born at head-quarters of the regiment since their fathers have been treated for venereal complaints without mercury, have any symptoms been observed bearing the least analogy to syphilis.

“As in most of the instances of venereal complaints among the soldiers, the subjects are either unmarried, or have only married recently; but a small number of them have had children born to them since their treatment. Among the companies that are at present at head-quarters, there have been only eight children born to fathers of this description. One of these, the child of the latter woman, was still-born, as already stated, and another child died a few weeks after birth of small pox. The other six children are all healthy and thriving, and free from any appearance that can excite the slightest suspicion of venereal taint. I ought to have stated, in its proper place, that the first-mentioned woman had, on two former occasions, brought forth still-born children; she has also had four born alive. The latter woman conceives she also must have carried the *foetus* a long time dead, from not having been sensible of its movements for a month before delivery.”

Of the eruption in the child belonging to the detachment of the 88th regiment, there is not the most remote reason for supposing that it proceeded from a syphilitic taint. With regard to the two still-born children, it must be admitted that there was

room for *suspicion*, but it would be in vain to enter into an investigation, as they were never subjected to the examination of a medical man, and the appearances on their bodies, are merely described from the reports of their mothers, who, in the class of persons to which these women belonged, are always prone to exaggeration, and delighted with the marvellous. It is to be observed, that the reputed symptoms of lues in children do not appear, in general, until some time *after birth*; and many eminent men, Mr. Pearson, I believe, among them, have never met with an instance where the child has been born with the disease. It is farther to be recollectcd, that, long previous to the non-mercurial trial in one of these women, she had produced still-born children.

The same spirit of candid investigation which has directed the army surgeons in the preceding steps of their inquiry, will, I have no doubt, influence them in future; and the objections of the ingenious professor of midwifery in Edinburgh will meet with that patient examination which their importance deserves, and which his rank and character justifies. In the mean time, I may be allowed to review, in a cursory manner, some of the leading circumstances said to characterize the syphilis of infants. 1st, *Ophthalmia*. This is said to be the leading symptom; but it may occur, and assuredly does so in the majority of cases, from causes altogether unconnected with syphilis. The acrid discharges of the mother, more especially when she labours under gonorrhœa or fluor albus, most frequently occasion this disease by their local effect on the eyes of the infant during its passage through the vagina. 2d, *Pustules running into ulceration*. Not to mention that the various eruptions which affect the tender cutaneous texture of infants arise from numerous causes, altogether unconnected with constitutional disease, we should not forget that there is the strongest reason for supposing, that, in pure, unmixed syphilis, eruptions rarely, if ever, run into ulceration, except where mercury has been pushed very far. Ulcerated pustules, therefore, are to be looked upon more as a proof of the employment of mercury, than of the existence of syphilis. 3d, *Discoloration of the skin; stridulous voice; and the appearance of old age*. To enlarge upon all the cutaneous dœfadations and congenital spots of infants, is a task on which I do not conceive myself qualified to enter; but it would not be difficult to prove that they all occur without any just cause for attributing them to syphilitic infection. Indeed, we know that the very symptoms above enumerated are the most prominent marks of malconformation of the heart and great vessels, by which so many deaths are occasioned in infants. The dissection, therefore, of the "petit viellard," will become an ob-

ject of importance in such cases as may hereafter occur, and we may perhaps be enabled to refer to an anomaly in nature, which has hitherto been considered as attributable solely to an error of the parent. *4th, Aphthæ.* From how many sources aphthous affections may arise is known to every practitioner, and it is equally well known that they are produced from causes where there does not exist the most remote reason for suspecting syphilis. A child with an aphthous affection of its mouth will often communicate a most severe disease to the nipple of its mother, capable of being propagated to another infant, and of exciting severe constitutional irritation. Even in adult age aphthous affections are communicable by the touch in many instances, and give rise to great uneasiness from their obstinate character. I am intimately acquainted with a physician who contracted an aphthous affection of his lip, by taking a last farewell of a most respectable lady who was far advanced in phthisis, and whose lips were affected with those aphthous eruptions which so often arise in the latter stages of that disease. In a short time the point of his tongue was covered with small and very painful ulcers, extremely like minute chancres, and in some weeks after he became affected with a scaly eruption of the hairy scalp. I had occasion particularly to examine him in about three months after the first appearance of the ulcerations of his tongue; the eruption was gone, but from one part of the scalp the hair was dropping very fast.

With regard to still-born children, it is almost unnecessary to say, that one miscarriage will lay the foundation for many subsequent ones, and that, until the habit is broken, the same propensity may continue during the remainder of life. It is also well known, that in whatever state of health the mother may be, the long retention of a dead fœtus occasions various morbid states of the skin, such as partial excoriations, extensive peelings when touched, loose, puckered, or wrinkled appearance, &c. Upon the whole, without pretending to enter more minutely into all the symptoms said to proceed from syphilis in infants, I have the authority of a teacher of unquestionable reputation to assert, "that there is perhaps no individual symptom which can decidedly characterize syphilis in infants;" and "that many children are rashly put upon a course of mercury who do not require it; perhaps because the practitioner thinks it a point of honour to determine the nature of the disease at the first glance."*

Another question arises on this subject. Admitting that the disease of infants is really syphilis, does it indispensably require

* *Principles of Midwifery*, by John Burns, 2d edition, p. 621.

the mercurial treatment in every instance? If it were proved, that all the children thus affected were infallibly restored to health by the use of mercury, and that all those who did not use it infallibly died, no man of common sense, or of any pretensions to humanity, could be justified in withholding it. Indeed, in these tender subjects this remedy is borne so much better than in adults, that we are encouraged in the employment of it in their cases, especially when we recollect how much their constitutions appear to be influenced by the peculiarities of their hepatic system, and how sensibly the preparations of mercury operate upon that system; but notwithstanding Dr. Hamilton's opinion to the contrary, so strongly expressed at p. 61 of his work, we have just reason to suppose that children have recovered from the disease, not only without mercury, but spontaneously, and without any other remedy whatever, and this from the testimony of Messrs. Bertin and Mahon, the most distinguished writers upon the subject, both of them staunch mercurialists, and generally quoted for an opposite opinion. The former in his introduction, (second part, p. 45,) while speaking of the difficulty of the diagnosis, alludes to the spontaneous disappearance of many of the symptoms; and Mahon, in his "*Oeuvres Posthumes*," details a case at p. 416, which he precedes by the following words: "On ne peut nier cependant qu'il ne puisse arriver que les symptomes veneriens disparaissent chez des enfans nouveau nes a qui on n'a fait aucun remede. J'en ai eu plusieurs, exemples," &c.

While the great mass of medical men believed that the syphilis of adults was absolutely incurable without mercury, it was natural for them to apply the same opinion to the disease, or the suspected appearances, in infants; but it is to be hoped, that, in the present state of our knowledge of the natural history of syphilis, imperfect though it be, we will not withhold from the rising generation the chance of those benefits which have already accrued to those of more advanced years, by limiting and diminishing the employment of mercurial medicines.

Thus have I given a faithful account of all that I have learned with regard to the non-mercurial treatment of syphilis, as it has been practised in the military hospitals. It gives me great pleasure to be able to state, from good authority, that the practice has been adopted by some of the naval surgeons with a success even greater than ours; and I have at present before me a letter, which, I trust, will soon be published in a more enlarged form, giving an account of the successful treatment of no less than fifty patients in one ship, in one only of whom did secondary symptoms appear, (under the form of blotches,) and they were entirely removed in the course of eight days, without the em-

ployment of one particle of mercury, either externally or internally. While these sheets are going through the press, I have also had before me testimonies from the officers of our own service, which still farther tend to confirm the principles which I have advocated. These documents will, at some future period, be submitted to the judgment of the profession.

APPENDIX.

As I have made such frequent reference to diet, I shall, for the non-military reader, give the present improved scale of British Hospital Dietary, which I conceive to be the most perfect hitherto adopted in armies.

DIET TABLE.

For Full Diet. Breakfast, one pint of oatmeal or rice gruel. Dinner, three-fourths of a pound of meat, one pound of bread, one half pound of potatoes, one quart of table beer. Supper, one pint of oatmeal or rice gruel. *For Half Diet.* Breakfast one pint of oatmeal or rice gruel. Dinner, one-half pound of meat, three-fourths of a pound of bread, one pound of potatoes. Supper, one pint of oatmeal or rice gruel. *For Low Diet.* Breakfast, tea. Dinner, one-fourth of a pound of meat, one-half pound of bread, one-half pound of potatoes. Supper, one pint of oatmeal or rice gruel. *For Spoon or Fever Diet.* Breakfast, tea. Dinner, one-half pound of bread made into panado or pudding, or sago. Supper, tea.

Extras. All extra diet must be stated and charged in the proper table of the periodical return, against the patient's name; wine used in panado or sago, or in any other kind, of food, must be similarly specified in the wine return. The fever or spoon diet is adapted to such cases as will not allow of any excitement from animal food, in the shape of broth, or otherwise; and any extras to this rate of diet are supposed to be given with the same view.

Articles composing the different diets for a day, avoirdupois weight. *Full*, meat twelve ounces, bread sixteen ounces, potatoes eight ounces, oatmeal three ounces, or rice two ounces, barley three-fourths of an ounce, sugar one ounce, salt one-fourth of an ounce, beer one quart. *Half*, meat eight ounces, bread twelve ounces, potatoes sixteen ounces, oatmeal three ounces, or rice two ounces, barley three-fourths of an ounce, sugar one ounce, salt one-fourth of an ounce. *Low*, meat four ounces, bread eight ounces, potatoes eight ounces, oatmeal one-half ounce, barley one-half ounce, tea two drams, sugar one ounce, salt two drams, milk two ounces. *Spoon or Fever*, bread eight ounces, or sago four ounces, tea two drams, sugar one-fourth of an ounce, milk four ounces.—

Note.—The meat is to be boiled, so as to make a pint of good broth for the dinner of each patient, for which the barley is allowed.

When it shall be found necessary to put any patient upon a milk diet, it is to be done by giving a pint of milk morning and evening, for breakfast and supper, in place of tea, the spoon or fever diet, and one pint for dinner; and it will be expected, that medical officers be careful not to order any milk under the other heads of diet, or promiscuously, in cases of disease, as in many it is not only unnecessary, but rather prejudicial; while, in several of the sequels of pneumonia, and of syphilis, and in phthisis pulmonalis, as well as in hectic fever accompanying other chronic diseases, milk may be exhibited in the way above-mentioned. If, on any other occasion, a medical officer shall think it expedient to order extra milk, a detail of the necessity will be expected, as it will also be when other extra articles are given: the present table of diet allowing amply for almost all cases of disease and convalescence. During the period of convalescence, it is recommended to medical officers to put the patients gradually upon such diets as approach nearest to their ordinary food in health, for much injury often arises, as has but too frequently been observed, from their passing at once from low, or even spoon diet, with either one, or perhaps numerous extras, to the usual food of a healthy man.

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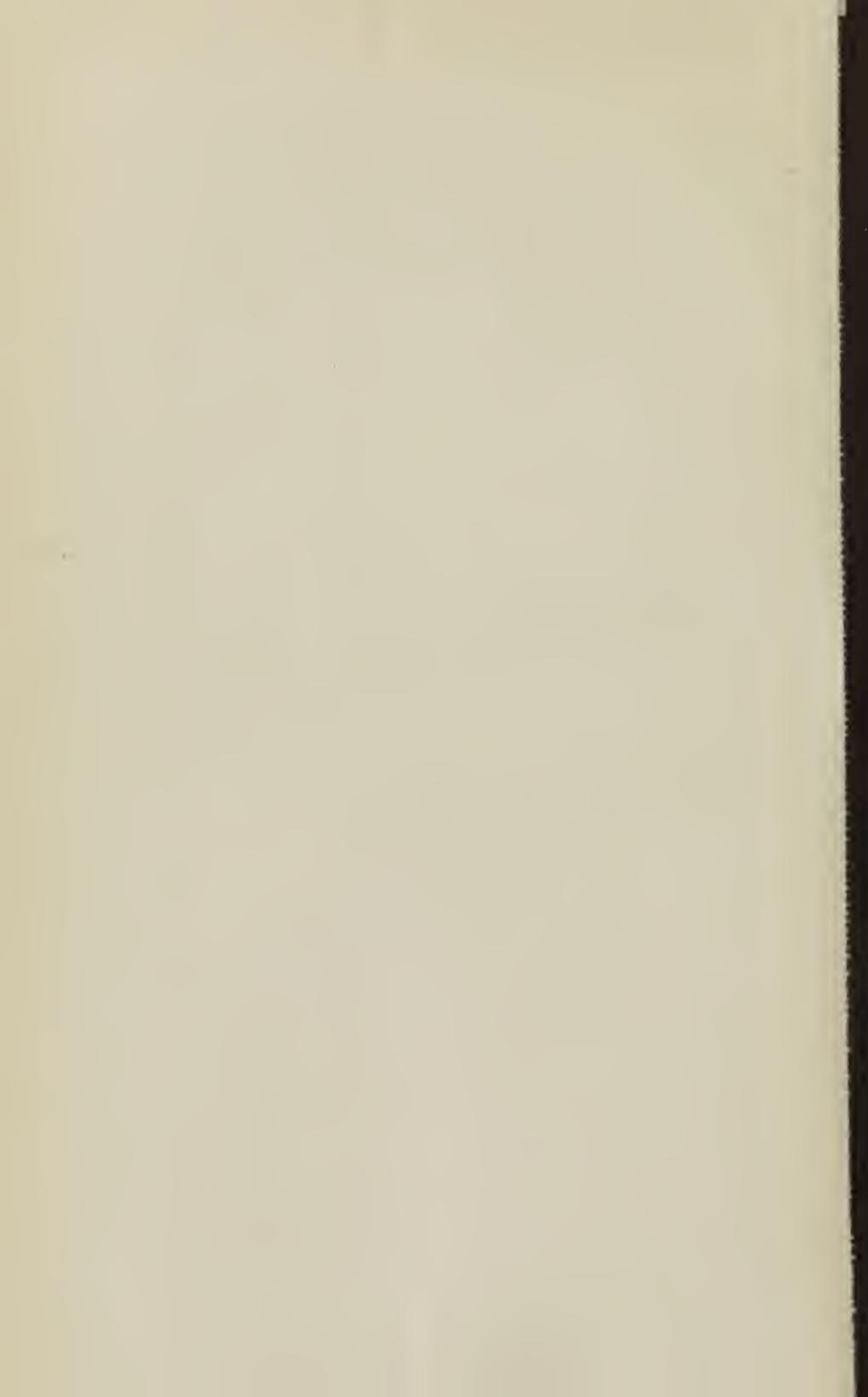
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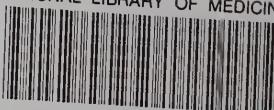
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